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HIGHLIGHTS OF TOTAL QUALITY MANAGEMENT
IN THE DEPARTMENT OF DEFENSE:
LESSONS LEARNED, QUALITY MEASUREMENTS
AND INNOVATIVE PRACTICES

by

Carolyn L. Applegate
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Thesis Co-Advisor: Susan Page Hocevar
Thesis Co-Advisor: Kenneth W. Thomas

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This thesis aids in understanding the implementation of Total Quality Management (TQM) through both quantitative and qualitative analyses. Interviews were conducted with top executives from ten exemplar organizations in the Department of Defense (DOD). Survey questionnaires were administered to a sample of 102 representing members of the executive steering committees at the same organizations. Research identifies lessons learned by top executives during TQM implementation, discusses measures of organization-wide quality management, specifies evaluation mechanisms to discern strategic issues vital to a vital focus, and describes the TQM implementation plan. Research also identifies innovative practices such as self-managing work teams, learning centers and productivity gain sharing, which may benefit the top executive during his/her own implementation. Conclusions and recommendations concern maturity of TQM implementations in the DOD, performance appraisal systems, and quality assessment tools.

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Highlights of Total Quality Management in the Department of Defense:
Lessons Learned, Quality Measurements and Innovative Practices

by

Carolyn L. Applegate
Lieutenant, United States Navy
B.S., University of Pennsylvania, 1985
M.B.A., Golden Gate University, 1989

Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

This thesis aids in understanding the implementation of Total Quality Management (TQM) through both quantitative and qualitative analyses. Interviews were conducted with top executives from ten exemplar organizations within the Department of Defense (DOD). Survey questionnaires on perceptions of quality practices were administered to a sample of 102 representing members of the executive steering committees at the same organizations. Research identifies lessons learned by top executives during TQM implementation, discusses measures of organization-wide quality management, specifies evaluation mechanisms to discern strategic issues vital to a quality focus, and describes the TQM implementation plan. Research also identifies innovative practices such as self-managing work teams, learning centers and productivity gain sharing, which may benefit the top executive during his/her own TQM implementation. Conclusions and recommendations concern maturity of TQM implementations in the DOD, performance appraisal systems and quality assessment tools.

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I. INTRODUCTION

A. THE QUALITY REVOLUTION IN THE PUBLIC SECTOR

During the 1980s, the total quality movement acted as a catalyst to private sector manufacturing industries; now, quality practices are becoming a focal point in service industries in both private and public sectors. The shift toward quality in service industries is evident through the Malcolm Baldridge National Quality Award for 1990, which recognized the first service organizations to win this prestigious award--Federal Express Corporation and Wallace Company, providing services for mail and construction supplies, respectively.

Private sector businesses undertake fundamental change for reasons of efficiency and survival; likewise, today, the government is also faced with tremendous pressure to economize. The last few years of austere funding have provided an impetus to change and improve, by challenging Department of Defense (DOD) activities to increase productivity and cope with shrinking budgets. To face this challenge, some public managers have embraced the quality movement as a path by which progressive business practices can impact cost, efficiency and quality of DOD services.

Can the public sector offer its customers the same quality of services they have come to expect from quality leaders in the private sector? The answer is yes. Transferring this new way of thinking to the public sector has enabled quality practices to revolutionize the way some elements of the DOD conduct operations. A quality focus

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requires a shift toward a human resource revolution which emphasizes people, not machines. As the Master Chief Petty officer of the Navy says, Total Quality Management (TQM) "puts sense back into the system" (Bushey, 1991). As proof, several of DOD's 'business units' are achieving higher quality, productivity, and cost savings, which allow them to compete successfully with private sector businesses. Additional examples indicate that quality management practices can enable public sector organizations to improve customer service while saving taxpayers' money.

Promoting quality practices in the DOD requires an extensive level of education for the organization and its stakeholders. Customers, suppliers, and even Congress can all benefit from quality if they share information and foster education. More importantly, the quality movement has provided the emphasis on application, which is sorely needed in a nation which prefers to recognize basic research and the Nobel Prize over excellence in application. From an operational perspective within the DOD, application of quality practices equates not only to cost savings and efficiencies, but to the bottom line of saved lives as well.

B.   RESEARCH OBJECTIVE

This thesis aims to provide qualitative and quantitative analyses of Total Quality Management implementation in the Department of Defense. It describes lessons learned by top executives during TQM implementation in order to educate, heighten awareness of quality practices, and demystify TQM. The results provide thought-provoking information for organizations already embarked on TQM implementation, as well as those

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just starting to focus on quality management. In addition, this research measures perceptions of quality management within participating organizations using a validated research instrument.

C.   RESEARCH QUESTIONS

The primary research question is "What strategic issues must a top executive be concerned with to successfully implement Total Quality Management?" Subsidiary questions include: "How does one measure organization-wide quality management?"; "What kind of evaluation or feedback mechanism can help the top executive identify which issues are vital for a successful shift to quality?"; and "What kind of implementation plan is needed?"

1.   Scope

This thesis is not a prescriptive, "how-to" guide for implementing TQM. Research results are not meant to provide rules for managing quality because each organization must structure its implementation efforts to fit its mission and culture. Rather, this thesis is an exploratory study into real-world lessons learned during TQM implementation by top executives in DOD. Quality is examined in terms of critical factors, rather than a specific quality expert's teachings.

2.   Limitations

This study of lessons learned during implementation and measurement of organization-wide quality management is limited by two factors. First, only 11 organizations within DOD were targeted as study participants. These organizations were

selected based on official recognition and sufficiency of documented material on their quality activities, not necessarily equating to all of the best in DOD. Second, the quantitative evaluation of quality management was based on a small number of respondents from each organization's executive steering group, not the entire organization.

3. Assumptions

This thesis assumes a basic knowledge and understanding of quality practices, including the concepts of customer satisfaction, continuous improvement, and top management leadership. Also, familiarity with DOD's Total Quality Management principles and tools will help to mature the reader's understanding of the subject.

D. ORGANIZATION OF THE THESIS

This thesis is divided into six chapters beginning with Chapter I which provides an introduction to the subject, a justification for the research, and a discussion of research questions and organization of the thesis. Chapter II contains background material in four sections on literature review, public sector strategic management, a history of TQM in DOD, and quality assessment. Chapter III details the selection of a research strategy, choice of organizations, the questionnaire, documentation, the interview, and the approach to data reduction on research results. Chapter IV describes research results from the interviews and survey questionnaires, including lessons learned and an analysis of the survey data. Chapter V discusses innovative practices including strategic planning and implementation, self-managing work teams, training, recognition **and reward** systems,

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performance appraisal systems, and communication. Finally, Chapter VI develops

conclusions and recommendations for future study.

II. BACKGROUND

A. LITERATURE REVIEW: QUALITY MANAGEMENT

The purpose of this section is to provide a brief introduction to quality management and how it relates to this thesis research. During a literature review of total quality management, the author found that successful private sector companies are well represented in the quality literature with numerous descriptions of individual organizations' quality concepts and improvement programs (Birdsong, 1989; Bond, 1989; Control Data, 1988; Harry, undated; Kanter, 1991; Louise, 1989; Mondon, 1982; Scherkenbach, 1986; Scott, 1981; Wagel, 1987; Walton, 1986; Walton, 1990). Similarly, public sector success stories in quality management are also available reading in the literature (Broedling, 1991; Cox, 1990; Fortson, 1989; QIP 2-3,5-6,10, 1991; QIP 4,7, 1990; QIP 1, 1989; QIP 9, 1988; QIP 8, 1987; Ray, 1988; Sensenbrenner, 1991; Walton, 1990). A distinct difference between the two groups of writings is the variety of private sector approaches to quality as compared to the public sectors's reliance on one philosophy known as Total Quality Management, closely modeled after the writings of W.E. Deming (Deming, 1982;1986).

Various authors on quality recommend principles for effectively managing quality. These include Deming (1982;1986), Juran's (1986) quality trilogy, Crosby's (1979) zero-defect improvement programs, Ishikawa's (1985) total quality control, and Leonard and Sasser's (1982) identification of quality levers. It is notable that all of these authors

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discuss the ideals of top management commitment, education, continuous improvement, and employee involvement. Examination of these and other principles provides a foundation for recognizing areas critical to any change in quality focus.

Deming's 14 points prescribe a basis for effective quality management. They include: create constancy of purpose, adopt the new philosophy, cease dependence on mass inspection to achieve quality, stop awarding business on the basis of price tag alone, improve constantly the system of production and service, institute training on the job, institute leadership, drive out fear, break down barriers between departments, eliminate slogans and numerical targets, eliminate work standards and management by objective, remove barriers that hamper pride of workmanship, institute a vigorous program of education and self-improvement, and put everyone at work to accomplish the transformation. A life-long statistician, Deming demands top management commitment to quality, continuous improvement measured through statistical control techniques, elimination of numerical quotas and goals, as well as organization-wide education in quality. (Deming, 1982;1986)

Another well-recognized quality expert is Juran, who publicizes the differences in methods and results of Japanese and Western approaches to quality. These differences concern emphasis on quality planning, product design and participative management. Post World War II, Japan was dissatisfied with "quality and a program of evolution," while the West was satisfied with that standard (Juran, 1978). Juran's trilogy for quality encompasses quality control, quality improvement, and management breakthrough as

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methods to systematically improve quality through planning, product design, and product development (Juran, 1986;1989).

Crosby emphasizes behavioral issues in the quality arena, such as rewards and employee motivation. He articulated such popular concepts as "do it right the first time," "quality is free," and "zero defects." His zero defects program prescribes management commitment, training, and collecting data on the cost of quality through measurement. Crosby also developed a quality maturity grid to evaluate organization-wide quality management. (Crosby, 1979)

Ishikawa promotes the concept of total quality control, and is well known for recommending use of quality circles and cause-and-effect diagrams by workers and front-line supervisors. He argues that top management must assume leadership to achieve a breakthrough to quality, and that quality control can not progress without attacking middle management. Ishikawa emphasizes "the next process is your customer," and advocates education as the tool to make this happen. (Ishikawa, 1985)

Leonard and Sasser claim that management must choose what to do and how to do it in order to improve service and quality. Thus, identification and choice become the quality levers by which management influences quality improvements. They identified such levers as top management commitment to quality, analysis of factors affecting organization-wide quality, employee training and education, and congruent reward and personnel evaluation systems. (Leonard and Sasser, 1982)

Garvin proposes measuring quality as a function of internal failures (i.e., defect rates) and external failures (i.e., customer service calls) based on an extensive comparative

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study of air conditioner manufacturers in the United States and Japan; this study concluded the leading performers had top management support, better information systems for quality data, and superior product design through cross-functional teams (Garvin, 1983).

The first thorough and systematic attempt to synthesize some of these quality concepts is shown in Table 1, adapted from a previous study (Saraph, Benson and Schroeder, 1989). Building on the writings of quality management authors, Saraph et al. propose organizational requirements for effective quality management. These organizational requirements are classified into eight critical factors necessary to achieve a successful shift to a quality focus. They include: the role of management, leadership and quality policy; the role of the quality department; training; product and service design; supplier quality management; process management; quality data and reporting; and employee relations.

Other authors on quality comment on similar concepts, adding to the literature concerning cross-functional teams and product design. Taguchi and Clausing (1990) claim "quality is a virtue of design," and that proof of a product's quality is performance. In the same vein, Hauser and Clausing (1988) propose the use of quality function deployment as a method to improve the quality of product design. The principle underlying quality function deployment is to establish clear relations between manufacturing functions and customer satisfaction using a matrix in order to break down functional barriers and encourage team work.

Table 1: ORGANIZATIONAL REQUIREMENTS FOR EFFECTIVE QUALITY MANAGEMENT EMPHASIZED BY SELECTED AUTHORS (adapted from Saraph et al., 1989)

Critical Factors	(Crosby, 1979)	(Deming, 1982; 1986)	(Garvin, 1983)	(Juran, 1978; 1986; 1989)	(Ishikawa, 1985)	(Leonard and Sasser, 1982)
Role of top management leadership and quality policy	Management commitment, quality goal setting.	Define management's permanent commitment to implement Deming's principles. Create constancy of purpose towards quality. Adopt new management philosophy towards defects, mistakes, and defective materials.	Set quality programs and policies, attitudes of management and employees.	Upper management leadership and quality policy.		Personal concern for quality and quality-concious management style. Assign responsibility for quality. Top management's strategic support for quality.
Role of the quality department	Quality councils. Quality improvement teams.			Organizational mechanism/ program to improve quality.	Quality function is the responsibility of all departments.	Professional quality assurance and control staff.
Training	Supervisor and employee training.	Use modern methods of training using statistics. Institute vigorous program of training and education.		Training, at all levels appropriate to quality tools.	Training of employees in problem solving, data analysis and statistical techniques.	Training and development of management and employees.
Product/service design	Full understanding of customer product and service requirements.		Product design through reliability planning, trial production, and testing and producibility.	Product design emphasizing fitness for use.		

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Supplier quality management		Reduce suppliers, award contracts on basis of quality. Do not choose suppliers on cost alone.	Vendor management by streamlining vendors, long term relationships, emphasis on quality, not cost.	Vendor relations using statistical methods.	Organization-wide analysis of quality problems.	
Process management	Qualification of process. Corrective action. Zero defect planning. Error-cause removal.	Use statistical tools in manufacturing and purchasing. Search continually for problems in system (design, materials, machines, training, supervision). Emphasize teamwork for solving quality problems (sales, manufacturing, research and design).	Production and workforce policies, smooth production schedule.	Process design emphasizing quality planning and quality improvement.	Process improvement through problem analysis.	
Quality data and reporting	Quality measurement. Cost of quality.	Use statistical methods to improve quality continuously.	Quality information system.	Quality information system, including cost of quality, external and internal failure data.	Quality data gathering and analysis at all levels.	Quality information system for effective decision making at management and employee levels.
Employee relations	Employee recognition. Quality awareness. Zero-defect day.	Remove all barriers to workers' pride of workmanship. Eliminate quality-related numerical goals and quotas. Modern supervision ensuring immediate action on quality problems. Encourage communication.	Employee involvement in quality improvement at all levels and in all functions.	Employee relations including quality circles.	Employee involvement in quality problem solving.	Open participation by employees in quality improvement.

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Several authors foresaw the movement of quality into service industries (Deming, 1982; Peters, 1989; Reichheld and Sasser, 1990). In particular, Reichheld and Sasser proposed that service companies track lost customers as their "scrap heap," because quality does not improve unless it is measured. Thus, they coined the phrase "zero customer defections" equating to the manufacturing industries' "zero defects."

B. PUBLIC SECTOR STRATEGIC MANAGEMENT

Understanding public sector strategic management can directly influence the success of an organization's TQM implementation. The purpose of this section is to discuss some implementation ideas or areas valuable to top management. Topics covered include strategic planning, implementation, leadership and coping with change.

The cornerstone of any TQM implementation is a thorough strategic quality plan (Svenson and Brown, 1990). This plan must be flexible and incremental rather than full-blown and thoroughly articulated; in this way, one can avoid endless preparation steps and spur on the strategic process in light of a complex and quick changing environment. The end result is to lessen time to implementation (Quinn, 1989) by getting started, now.

Some authors believe that strategic management in the public sector is possible by applying strategic management principles from the private sector (Wheelen and Hunger, 1986; Wortman, 1979). An opposing view is that most public sector efforts at strategic management will not succeed (Bryson, 1990; Roberts, 1991). Others contend that public sector strategic management is different from the private sector, chiefly in terms of context; for example, differences are said to exist in time perspective, duration of to

management, performance measurement, personnel constraints, equity versus efficiency issues, level of scrutiny of public processes, the role of the press and media, coalitions, and legislative and judicial impacts (Allison, 1983).

Failure during implementation is one reason why so many grand projects never reach their objectives. Most change programs rely on changing individual knowledge and attitudes instead of emphasizing changed behavior. One author recommends placing employees in a new organizational context which imposes new roles, responsibilities and relationships on them, thereby creating a situation that basically forces new types of behavior (Beer, 1990). Author and consultant Tom Peters (1989) prescribes numerous suggestions for increasing implementation success, but particularly emphasizes "small wins," another phrase for Peters and Waterman's first principle--a bias for action (Peters and Waterman, 1985). Both ideas for implementing change are in line with an incremental approach to public sector strategic management. The emphasis on action is particularly important given the public sector's enormously complex decision-making environment.

In terms of management and leadership, strategic managers must understand the importance of organizational culture in order to lead their organization to shift in focus to quality. An important distinction is made by Cyert, who believes that managers emphasize process while leaders emphasize environment and culture within the organization. A leader controls the attention focus of participants in the organization, trying to convince subgroups to adopt the organization's goals (Cyert, 1991). During an organization's TQM implementation, one of top management's most important tasks is

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to persuade individuals to work towards organizational goals. One of the methods used is to provide top management's guidelines and expectations to the workforce, as well as education and training. Another definition of leadership is to build momentum and guide implementation by looking for pockets of least resistance (Peters, 1989). This principle is useful when selecting initial areas for TQM process action teams.

Strategic quality management also requires a powerful person to sponsor the process and provide legitimacy. In many cases, a second person becomes the champion of the process by rousing enthusiasm and morale. Total quality management encourages the public manager to act in deliberation with all levels of the organization about how problems are defined and understood, what are possible solutions, and who should have the responsibility for solving them. Deliberative relationships, therefore, become an integral part of TQM and require superior communications skills and management leadership to succeed. (Reich, 1990)

Another important point concerning strategic management in the public sector is coping with change. Learning to live with change--to thrive on the challenge of constant change--is far different than simply coping with change and succeeding despite it (Peters, 1988). A successful TQM implementation demands proaction to overcome resistance to change, and to take on chaos in the organization's environment and succeed with, not despite, it. The metaphor of "permanent white water" captures the feeling of continuous upset and chaos experienced by today's manager (Vaill, 1989). In this context, flexible, incremental steps as opposed to major programs seem a better choice for achieving any sort of change in organizational direction.

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C. HISTORY OF TOTAL QUALITY MANAGEMENT IN DOD

The President of the United States signed Executive Order 12552 on 25 February 1986, establishing a Productivity Improvement Program for the federal government, in order to improve the efficiency, quality, and timeliness of service to the public with a 20% increase in selected areas by 1992. Subsequently, Executive Order 12637 of 27 April 1988 emphasized quality and modified the goal to an annual productivity increase of 3%. This translates into maintaining productivity levels with a 3% per annum decrease in budget. About the same time in the private sector, Public Law 100-107 established a national quality award on August 20, 1987--the Malcolm Baldridge National Quality Award.

DOD established a productivity program as detailed in DOD Directive 5010.31 which provides guidance and policy for improving in-house efficiency and effectiveness in the military. Over the years, evolution of improvement efforts changed from 'productivity' improvement to 'total performance' improvement to recognition that total quality management has the best potential for continuous improvement in the long term. (Garrett, 1988a) This change in wording reflects an understanding that long term success depends not only on increasing productivity, but by continually improving all aspects of management.

In 1988, the Secretary of Defense issued a DOD posture statement on Total Quality Management (Carlucci, 1988), from whence the major services issued their own endorsements in-house (Garrett, 1988a; Garrett, 1988b; Secretary, 1988; Stone, 1988). Service actions included setting up executive steering committees to provide guidance on

implementation and institutionalization of TQM, and to serve as a forum for exchange of information and lessons learned. During the administration changeover after the 1988 presidential election, activity at the DOD level slowed and some of the military services picked up the slack at the individual services' secretariat level. The following discussion outlines some major efforts in TQM implementation within the three military services and one DOD agency.

The Air Force relies on its field commanders to lead TQM implementation; nine of the 14 major Air Force commands have active total quality management efforts as directed by the Corona conference, a top-level gathering of Air Force leadership (Defense, 1991). Senior leadership emphasizes education and awareness of TQM principles and tools, as well as networking through the Air Force Productivity Action Group. This group, composed of secretariat, staff and field members, meets to review, adopt, and reap benefits from field ideas. One of the Air Force's chief success stories is its Aeronautical Systems Division (ASD), which has set out to systematically change its culture. ASD has documented significant improvements in their source selection process, change order cycle time, personnel management systems, and relations with suppliers.

The Army drafted its TQM plan in response to an Undersecretary of Defense memorandum in 1988 (Costello, 1988). Its emphasis was applying TQM to acquisition of defense systems, equipment, supplies, facilities and services. The Army's executive steering group conducted a few meetings, issued their endorsement of TQM (Secretary, 1988; Stone, 1988), then got caught up in administrative changeover during 1988-9; activity at the secretariat level was suspended and momentum was lost. The Army's

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future plans include issuing a formal document rallying support for TQM through training. However, a recent Army Science Board Report found that senior and middle level Army leadership has not demonstrated a visible commitment to TQM or developed the organization's integrated implementation plan (Francis, 1990).

A bright spot in the Army's TQM implementation is the Army Material Command-- a front-runner with continuous top management support and commitment driving this successful operation (Tuttle, 1990; Wagner, 1988). Another promising example is the Army's Communication and Electronic Command (CECOM), which has reduced the time required to process contract justification and approval. They have also improved customer satisfaction with the contracting process, and thereby reduced contract protests and Congressional inquiries (Varian, 1990).

The Navy emphasizes leadership as the key to meeting the challenge of TQM implementation. Senior leadership endorsements exist at the secretariat level (Garrett, 1988a; Hoffmann, 1988) and at the Chief of Naval Operations (Kelso, 1991). The Navy's implementation plan (Garrett, 1988b) contains milestones for involving major functional areas in TQM. Overall, the Navy is striving for a system where decisions are based on facts, rather than intuition alone. The Navy's success stories are illustrated by the designation of several industrial facilities, such as the Naval Aviation Depot at Cherry Point and the Norfolk Naval Shipyard, as quality improvement prototypes (QIP). Success is also found in other shore administrative establishments like the Naval Publications and Forms Center, which was recognized as a QIP. In terms of operational forces, ADM

Kelso, Chief of Naval Operations, says, "...quality will become ever more important as our overseas force levels and budgets decline...I want to start now." (Phillips, 1991)

A TQM effort within DOD as a whole is illustrated by the Defense Logistics Agency. Their TQM implementation began with establishment of an executive steering group, which has focused organizational efforts on five areas: recruiting and training quality people, ensuring customer satisfaction, reducing costs, acquiring information systems to meet customer needs, and building an effective relationship with industry. In 1990, contract administration of the military services was consolidated with the Defense Logistics Agency becoming the Defense Contract Management Command. Quality management boards have continued to develop strategies to meet the five focus areas; results include programs that emphasize criteria other than price in the procurement arena, multi-year contracts, and direct shipping using commercial distribution systems instead of stockpiling at the depot level. (Defense, 1991)

D. QUALITY ASSESSMENT

For the past few years, top executives in a number of industries have been rethinking how to measure quality performance. During the 1980s, many managers involved in the quality movement came to realize that quality is a strategic weapon in a competitive world; this resulted in new performance measures such as tracking defect rates and response times (Troxell, 1981). The impetus of growth of the Total Quality concept, development of the Malcolm Baldridge National Quality Award, and increasingly

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stringent manufacturer demands on quality of supplier goods have led to a broadening of performance measures through an emphasis on quality. (Eccles, 1991)

One problem with these new performance measurements is that relying on measurements of customer satisfaction, quality, and innovation is not as well ingrained in today's managers as financial performance measures. Current information resources do not readily support real-time management using new quality measures, because they were designed based on traditional accounting systems. Real-time, operational measures of quality management, which broaden the basis of organizational performance measurement, can aid decision-makers to influence critical areas such as process management in order to improve performance. (Goldratt and Cox, 1986)

Most organizations which use statistical process control tools collect performance data such as rework or defect rates that focus on production. However, these measures are limited in that they do not reflect organization-wide quality management. Saraph et al. (1989) identified eight critical areas representing the aspects of quality management described by central authors in this field, and as summarized in Table 1 in the previous section. They developed scaled measures of eight "critical factors," including process management, training, and supplier quality management, for example. Operational measures of these critical factors can form a profile of an organization's quality management practices, while providing a benchmark for making decisions to achieve higher or more ideal levels of quality within an organization. The eight critical factors and an explanation of what they represent are shown in Table 2.

Table 2: CRITICAL FACTORS OF QUALITY MANAGEMENT
(adapted from Saraph et al.,1989)

Critical Factors of Quality Management	Explanation of Critical Factors
1. Role of management leadership and quality policy	Acceptance of quality responsibility by top management and department heads. Evaluation of top management on quality. Participation by top management in quality Improvement efforts. Specificity of quality goals. Importance attached to quality in relation to cost and schedule. Comprehensive quality planning.
2. Role of the quality department	Visibility and autonomy of the quality department. Quality department's access to top management. Use of quality staff for consultation. Coordination between quality department and other departments. Effectiveness of the quality department.
3. Training	Provision of statistical training, trade training, and quality-related training for all employees.
4. Product/service design	Thorough scrub-down process. Involvement of all affected departments in design reviews. Emphasis on producibility. Clarity of specifications. Emphasis on quality, not roll-out schedule. Avoidance of frequent redesigns.
5. Supplier quality management	Fewer dependable suppliers. Reliance on supplier process control. Strong interdependence of supplier and customer. Purchasing policy emphasizing quality rather than price. Supplier quality control. Supplier assistance in product development.
6. Process management	Clarity of process ownership, boundaries, and steps. Less reliance on inspection. Use of statistical process control. Selective automation. Fool-proof process design. Preventive maintenance. Employee self-Inspection. Automated testing.
7. Quality data and reporting	Use of quality cost data. Feedback of quality data to employees and managers for problem solving. Timely quality measurement. Evaluation of managers and employees based on quality performance. Availability of quality data.
8. Employee relations	Implementation of employee involvement and quality circles. Open employee participation In quality decisions. Responsibility of employees for quality. Employee recognition for superior quality performance. Effectiveness of supervision in handling quality issues. On-going quality awareness of all employees.

Another self-assessment tool for quality is readily available from the National Institute for Standards and Technology (NIST)--a Malcolm Baldridge National Quality Award application. The award was developed to recognize quality achievements of U.S. companies and publicize successful quality strategies. The award examination is based on quality excellence criteria created through a public-private partnership, utilizing resources such as prominent quality leaders in the private sector as trustees, the Department of Commerce's NIST, and the American Society for Quality Control.

This award examination is designed to serve as a diagnostic tool for an organization's overall quality management, as well as a basis from which to make awards. Highly recognized throughout the nation, the Baldridge award uses criteria which apply equally well to manufacturing and service businesses, and to large and small organizations; its impact and acceptance by American industries is evident by the 180,000 applications requested in 1990 (National, 1990).

A comparison of Saraph, Benson, and Schroeder's "critical factors" and the Malcolm Baldridge National Quality Award criteria is useful to validate the critical factors. Table 3 shows that, although the criteria vary in number of factors and overlapping of categories, the eight critical factors match the award criteria in all areas except quality results and customer satisfaction; Saraph et al. do not directly emphasize these areas. Also, critical factor #2--role of the quality department--seems to suggest a structural component more specific than does the Baldridge Award criteria.

While the eight critical factors proposed by Saraph, Benson and Schroeder are not as in depth and comprehensive as the Malcolm Baldridge Award criteria, their use as a

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Table 3: COMPARISON OF QUALITY EVALUATION CRITERIA

Malcolm Baldridge National Quality Award criteria note: * marks items not matched by critical factors	Corresponding Critical Factors (Saraph et al.,1989)
1. **Leadership** -senior executive leadership *-quality values -management for quality *-public responsibility	#1, #7
2. **Information and Analysis** -scope and management of quality data and information *-competitive comparisons and benchmarks -analysis of quality data and information	#7
3. **Strategic Quality Planning** -strategic quality planning process -quality goals and plans	#1
4. **Human Resource Utilization** *-human resource management -employee involvement -quality education and training -employee recognition and performance measurement *-employee well-being and morale	#3, #7, #8
5. **Quality Assurance of Products and Services** -design and introduction of quality products and services -process quality control *-continuous improvement of processes *-quality assessment *-documentation *-business process and support service quality -supplier quality	#4, #5, #6
6. **Quality Results** *-product and service quality results *-business process, operational, and support service quality results *-supplier quality results	none
7. **Customer Satisfaction** *-determining customer requirements and expectations *-customer relationship management *-customer service standards *-commitment to customers *-complaint resolution for quality improvement *-determining customer satisfaction *-customer satisfaction results *-customer satisfaction comparison	none

research tool allows for the assessment of organizational members' perceptions of quality practices based on critical areas for success. Other assessment tools use existing information systems to evaluate numbers and processes (i.e. defect rates), but fail to evaluate individual perceptions of overall quality management. One exception is a study conducted at the Naval Aviation Depot at North Island, California, which assessed the organization's move toward a more participative management style during TQM implementation, using a questionnaire aimed at identifying changes in workers' perceptions (Shettel-Neuber, Goldberg and Lew, 1987).

III. METHODOLOGY

A. SELECTION OF RESEARCH STRATEGY

The objectives and research questions for this thesis were discussed in Chapter I Sections B and C; the next step was to select the most appropriate method to answer those questions. Because the principle aim of this research was to determine lessons learned by top management, personal interviewing was chosen as the primary methodology to elicit such information. Additionally, this methodology captures the words of top managers, which may prove more persuasive and meaningful to the reader.

Multiple data sources and methods were used to enhance the reliability of these findings. Interview data were supplemented with questionnaire data from a structured survey and with written documents. Both quantitative and qualitative analyses were used to analyze the data collected. The overall research design is depicted in Figure 1. Once the subjects were selected, surveys were conducted and documentation collected on each organization. Both the survey data and documentation were used to develop interview questions. Strategic lessons learned were developed as an outcome of the interview process, while innovative practices resulted from both the interviews and documentation.

B. CHOICE OF ORGANIZATIONS

The study was targeted at DOD organizations already implementing TQM, leading the quest for quality within DOD, and maintaining a documented track record of
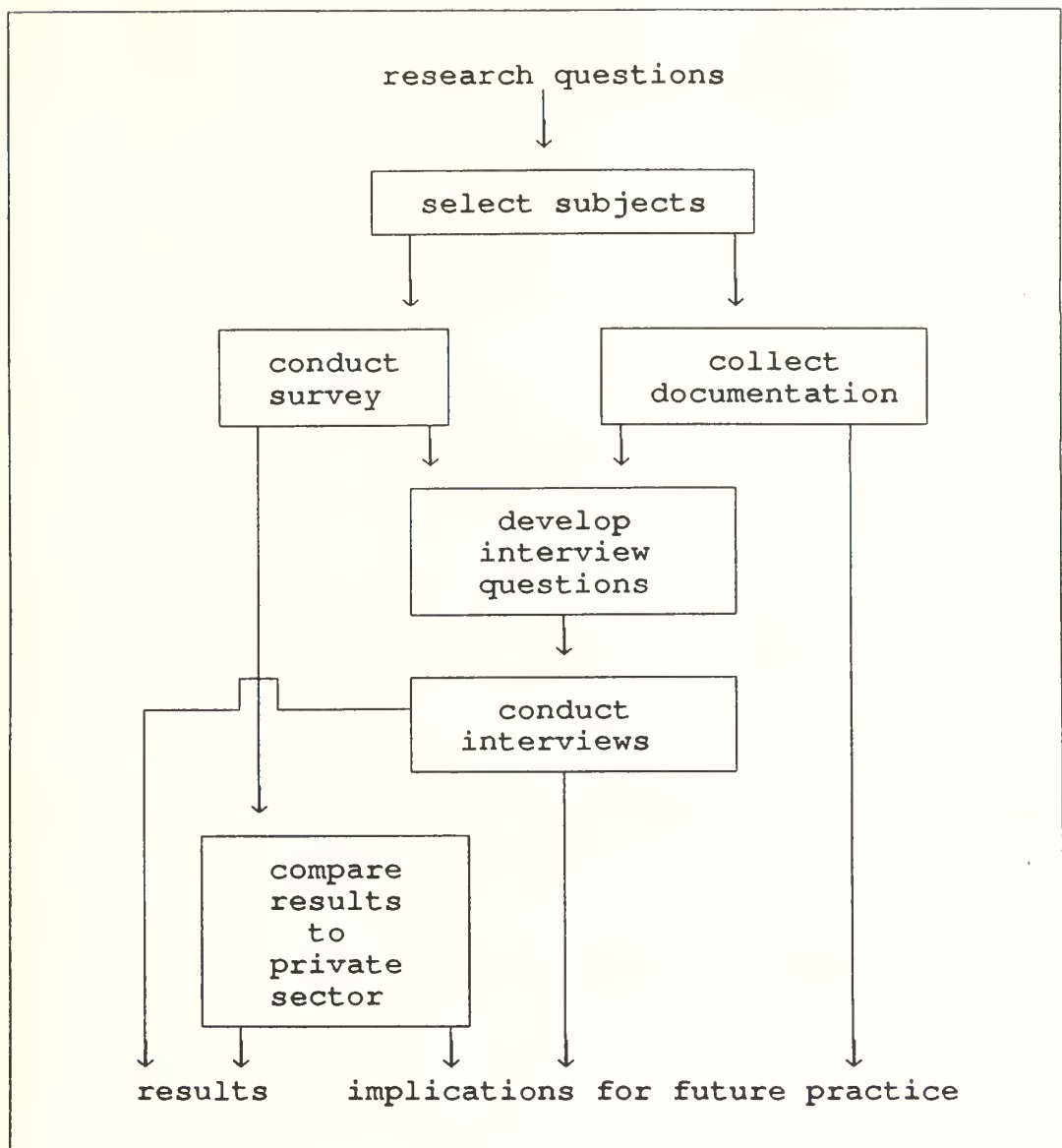
Figure 1: Research Design

activities. Specifically, the purposes, procedures and evaluation criteria of several quality

awards were analyzed to determine if any of these awards could be used to select DOD

organizations with good track records of quality, not necessarily all of the best in DOD.

Awards considered included the Malcolm Baldridge National Quality Award, the Institute

of Industrial Engineers Award for Excellence in Productivity Improvement, and DOD/Office of Management and Budget's (OMB) Productivity/Quality Improvement Prototype (QIP) award.

The QIP award recognition was selected as a criterion for research participation for several reasons. First, the QIP award is available to all DOD agencies. Second, its purposes are to recognize early successes, provide models for productivity improvement in other agencies, and provide visibility for high achievers. Managed by OMB as part of the Federal Productivity Improvement Program, QIP evaluation criteria includes management attention, achieved performance, and commitment to productivity/quality improvement throughout the organization. (Pineda, 1989)

The Federal Quality Institute was contacted in order to develop a list of QIP winners and finalists since the award's inception in 1988. The resultant list detailed the organization's name, year and level of award, address, point of contact and phone number for 23 organizations, 11 of which were within DOD. All the DOD organizations were contacted using this initial information and all agreed to participate, answering affirmatively within a tight deadline. One organization subsequently withdrew when it could not accommodate the time frame of this study.

Each DOD organization provided a point of contact responsible for all administration concerned with this study. The point of contact acted as a coordinator, receiving the pertinent number of surveys, making interview appointments with the top executive, providing requested documentation, distributing and collecting the surveys and

mailing all back to the researcher. In some cases, the coordinator also acted as a proponent of this thesis by persuading the top executive to permit participation in this study.

C. QUESTIONNAIRE SURVEY

1. Survey Instrument

A survey was selected from a private sector study which developed and validated an instrument to measure the critical factors of quality management (Saraph, Benson and Schroeder, 1989). This survey contains 78 questions composing the eight critical factors and describes a manager's perception of actual quality practices within his/her organization. This survey was adapted by this author for use within DOD by altering certain language; i.e., "non-supervisory employee" replaced "hourly employee," and "top executive" was changed to "commanding officer or executive director." The survey was modified by dropping 12 questions that were determined to be unreliable in the original study. The modified survey, containing 66 questions, was formally reviewed by two civilian professors of management in order to ensure the language changes would ease comprehension of the survey questions by the targeted audience. The modified survey as it was administered for this study is shown in Appendix A.

A typical survey item, as shown below, allows managers to indicate their perception of the degree or extent of a given practice within their organization:

	Extent or Degree of Current Practice Is				
	Very low	Low	Medium	High	Very High
Amount of final inspection, review or checking	1	2	3	4	5

Survey respondents were instructed to circle the number that represented their perception of quality management practices in their organization. Authors of the original survey instrument argued for validity of their eight critical factors of quality management by evaluating content validity, criterion-related validity and construct validity. Additional information on the validity of this instrument is given in Appendix B.

Based on the original instrument's arguments for validity, each critical factor was assessed using several component questions. For each component question and for each critical factor, the actual level of practice within or across organizations is represented by the average of the respondents' ratings for the component question or critical factor. The scale scores were calculated by summing the component item ratings and dividing by the number of items. A vector of these averages for the eight critical factors can be used as a quantitative profile of an organization's perceived quality practices. The items comprising each critical factor along with the coefficient alpha statistic of internal reliability are presented in Table 4. (See Appendix B for more information on instrument validation.)

2. Survey Administration

Survey respondents within the ten organizations were identified as members of each organization's quality council or executive steering commitee, because these people serve to lead the quality focus within each organization. Each survey respondent assessed the degree or extent of actual quality management practices in his/her organization according to the measure described in the previous subsection. The coordinator at each organization was responsible for both distributing and collecting the

surveys and mailing them back to the researcher. Table 5 lists the ten organizations anonymously, along with the number of responses anticipated and the number of survey responses received. The high percentage of participation by each organization (ten of 11) and by survey respondents (102 of 173) was due to the personal contact approach as well as motivation of each organization's point of contact and top executive.

3. Use of Survey Data

One of the primary reasons for collecting quantitative survey data and documentation was to develop interview questions for eliciting lessons learned by top DOD executives during TQM implementation. Average scores on the critical factors for each organizational profile suggested particular strengths or areas of difficulty. For example, one organization which scored exceptionally high in the area of training was asked more detailed questions in that area. Also, for the organization which scored the highest on the role of management and leadership, the interviewee was asked how the organization's TQM effort would survive without the top executive.

D. DOCUMENTATION

Various sources of documentation were used to develop both quantitative and qualitative background information on the ten participating organizations. These sources included individual applications for the QIP award, cost of quality data (defect rates, rework), strategic plans, and other documents detailing quality management practices within each organization. Additionally, several organizations' top executives' conference

Table 4 INTERNAL CONSISTENCY RELIABILITY ANALYSIS RESULTS FOR THE CRITICAL FACTORS OF QUALITY MANAGEMENT

Critical Factors and component questions	Coefficient Alpha
Role of top management leadership and quality policy	.91
-extent to which the top executive assumes responsibility for quality performance	
-acceptance of responsibility for quality by major branch/department heads within the organization	
-degree to which top management (commanding officer/executive director/major department heads) is evaluated for quality performance	
-extent to which top management supports long-term quality improvement process	
-degree of participation by major branch/department heads in the quality improvement process	
-extent to which top management has objectives for quality performance	
-specificity of quality goals within the organization	
-comprehensiveness of the goal-setting process for quality within the organization	
-extent to which quality goals and policy are understood within the organization	
-importance attached to quality by top management in relation to cost and schedule objectives	
-amount of review of quality issues in top management meetings	
-degree to which top management considers quality management as a way to increase revenues/reduce costs	
-degree of comprehensiveness of the quality plan within the organization	
Role of the quality department	.74
-visibility of the quality department	
-quality department's access to top management	
-autonomy of the quality department	
-amount of coordination between the qaulity department and other departments	
-effectiveness of the quality department in improving quality	
Training	.82
-specific work-skills training (technical and vocational) given to non-supervisory employees throughout the organization	
-quality-related training given to non-supervisory employees throughout the organization	
-quality-related training given to managers and supervisors throughout the organization	
-training in the "total quality concept" (i.e. philosophy of organization-wide responsibility for quality) throughout the organization	
-training in the basic statistical techniques (such as histograms and control charts) in the organization as a whole	
-training in advanced statistical techniques (such as design of experiments and regression analysis) in the organization as a whole	
-commitment of the top management to employee training	
-availability of resources for employee training	
Product/service design	.82
-thoroughness of new process/service design reviews before the process/service is implemented/produced	
-coordination among affected departments in the process/service development process	
-quality of new processes/services emphasized in relation to cost or schedule objectives	
-clarity of process/service specifications and procedures	
-extent to which implementation/producibility is considered in the process/service design process	
-quality emphasis by customer service employees	

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Supplier quality management
-extent to which suppliers are selected based on qaulity rather than price or schedule
-thoroughness of the supplier rating system
-reliance on reasonably few dependable suppliers
-amount of education of suppliers by the organization
-technical assistance provided to suppliers
-involvement of the supplier in the product development process
-extent to which longer term realtionships are offered to suppliers
-clarity of specifications provided to suppliers

.85

Process management
-use of acceptance sampling to accept/reject lots or batches of work
-amount of preventive equipment maintenance
-extent to which inspection, review or checking of work is automated
-amount of incoming inspection, review or checking
-amount of in-process inspection, review or checking
-amount of final inspection, review or checking
-stability of production schedule/work distribution
-degree of automation of the process
-extent to which the design is "fool-proof" and minimizes chances of employee errors
-clarity of work or process instructions given to employees

.73

Quality data and reporting
-availability of cost of quality data in the organization
-availability of quality data (error rates, defect rates, scrap, defects)
-timeliness of the quality data
-extent to which quality data (cost of quality, defects, errors, scrap, etc.) are used as tools to manage quality
-extent to which quality data are available to non-supervisory employees
-extent to which quality data are available to managers and supervisors
-extent to which quality data are used to evaluate supervisor and managerial performance
-extent to which quality data, control charts, etc., are displayed at employees' workstations

.88

Employee relations
-extent to which quality circle or employee involvement type programs are implemented in the organization
-effectiveness of the qaulity circle or employee involvement type programs in the organization
-extent to which employees are held responsble for error-free output
-amount of feedback provided to employees on their quality performance
-degree of participation in quality decisions by non-supervisory employees
-extent to which quality awareness building among employees is ongoing
-extent to which employees are recognized for superior quality performance
-effectiveness of supervisors in solving problems/issues

.80

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papers or videotaped presentations on quality within their organizations were also studied. Discussion of specific quality practices discussed in the documents is contained in Chapter V, as innovative practices.

E.   INTERVIEW

Nine of ten interviews were conducted by telephone due to cost constraints and arranged like a normal business meeting on the executive's calendar. One interview was conducted at the Naval Postgraduate School in Monterey, California where the interviewee was attending a senior leaders seminar on quality. Appendix C lists the ten participating organizations along with the name and title of each interviewee.

Table 5: SURVEY RESPONSE

Organization	Surveys received	Surveys sent	Response rate
#1	7	7	100%
#2	11	13	85%
#3	14	25	56%
#4	10	15	67%
#5	10	12	83%
#6	11	15	73%
#7	20	27	74%
#8	8	8	100%
#9	6	12	50%
#10	5	8	63%
Total	102	173	59%

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Interview lengths varied from 25 minutes to over one hour and were conducted without a recording machine. The focused interview method was selected because each respondent was interviewed for a short period of time, and the author followed a certain set of questions in an open-ended manner (Yin, 1984). Notes taken during each interview by the researcher were formally transcribed within 24 hours to minimize loss of information. Also, a condition of each interview was that all comments and opinions would be treated anonymously in order to elicit free communication on all issues. The following questions formed the core of each interview:

- What are some obstacles your organization has encountered during its TQM implementation, both internal and external to your organization, and how have you managed to get around them?

- Has your organization changed at all structurally as a result of your TQM implementation?

- Does your organization have a strategic plan/strategic quality plan?

- How does your organization identify, measure, and track customer satisfaction?

- How does your organization identify, measure, and track results of quality efforts?

In addition, other questions were tailored to each organization based on the survey results and documentation.

F.   DATA REDUCTION

Data reduction is the part of the qualitative data analysis process which refers to the process of selecting, focusing, simplifying, abstracting, and transforming raw data in order to draw conclusions (Miles and Huberman, 1984). As detailed in the previous section, the first interview question was aimed at eliciting lessons learned by top management,

while the other questions were targeted at developing implications for future practice. Data from the ten interviews was qualitatively analyzed using matrices in order to capture all descriptive information on a question, group the information by category, and place all evidence within each category. This method allowed for the determination of patterns of consistent responses. Strategic lessons learned are detailed in Chapter IV, while innovative practices are discussed in Chapter V.

IV. RESULTS

A. INTERVIEW

The purpose of this section is to answer the interview questions posed in Chapter III Section E. This section is separated into five parts, each answering a separate interview question. In regards to reporting, answers were considered individually, and subsequently grouped based on similarity of responses.

1. Lessons Learned

The following six areas highlight the ten interviewees' lessons learned when asked the following question:

- What are some obstacles your organization has encountered during its TQM implementation, both internal and external to your organization, and how have you managed to get around them?

a. *Top Management Commitment*

Five of the ten interviewees identified top management commitment as a vital element of TQM implementation. Recommendations included "managing by walking around," absolutely no delegation of commitment, and that the top executive must act as the ultimate teacher of TQM. Several interviewees' expression that commitment is "no instant pudding" (Deming, 1986) is a direct reflection of their understanding of DOD's principles of TQM, which are closely modeled after W. E. Deming's teachings.

Others were concerned about continuity, or Deming's "constancy of purpose" (Deming, 1986). Several solutions to this problem were discussed, such as

proactive communication to the workforce, TQM education to all levels of the workforce, and tying promotions to successful behavior. In particular, one lesson in communicating to the workforce was learned by an interviewee, who commented that a beneficial outcome to strategic planning was the strong message it sent to the workforce about what was important to top management. Additionally, the interviewees all tailored TQM principles to fit their own organizations, often with terminology and structure that varied across the organizations, thus providing evidence that there is "no cookbook approach" to TQM implementation.

Depth of understanding and commitment to TQM principles depended greatly on top management. However, the difficulty of achieving this was evidenced by the interviewees. A majority of the ten interviewees confessed to foundering in some way during development and expression of top management commitment. Three interviewees attributed this fact to their own inaction or inability to closely model their actions after their words. Two interviewees reported that they still fight their old behaviors and recommend the use of in-house facilitators to provide personal counsel. For example, a repeated error noted was when senior management got excited about TQM through initial training and they wanted to "start now." During TQM implementation, the two interviewees ignored middle management by failing to provide adequate awareness and skills training as well as top management guidance and expectations. Subsequent efforts at lower levels also failed when similar problems were encountered without the support or understanding on the part of middle management.

b. Structured Approach

Seven of the ten interviewees also considered a structured approach to continuous improvement as another vital element of TQM implementation. They advocated improving the process, not simply fixing the problems, using statistical process control (SPC) as the language of the process. In other words, they recommended identifying measureable criteria for change by "using data in steps of process definition, measurement, improvement and control." Two interviewees strongly advised focusing on processes, not quality of work life (QWL), since their own organizations had made this mistake during initial stages of implementation. This mistake changed the focus of their TQM implementation away from external customers to purely internal customers. Results of this QWL focus included no improvement in product or service quality and a noticeable decline in product or service on-time delivery.

Interviewees also argued for reliance on data to analyze processes, getting away from the "gut feel," "ruthless refinement and self-assessment," and "no competing strategies." In particular, one interviewee recognized that his organization's entire strategic plan was based on "gut experience" vice a goal of customer satisfaction; he wondered "how many wrong things are being worked on?"

Institutionalization of change was also viewed as important, so that the continuous improvement process endures even after the top executive moves on to other responsibilities. While the theme of institutionalization overlaps the lesson of top management commitment, it relies both on a formal basis of policies, systems, and structures as well as on flexible, reassessable implementation plans. For example, one

interviewee emphasized that the top executive's leadership had ultimately convinced his top management team that TQM was necessary for organizational survival, but only by an incredible level of persistance and his own changed behavior. In addition, the organization instituted formal systems, structures and policies including an executive steering committee, process action teams, a process-oriented focus through training, as well as supporting policies in the areas of performance evaluation, rewards and job security.

c. *Training and Education*

Eight of ten interviewees espoused training as a mandatory foundation for any successful TQM implementation. Training was seen as a method to overcome lack of a real understanding of TQM principles by supervisors, customers, and superiors in the traditional chain of command. Interviewees strongly believed that there are "no shortcuts" in training and education, that "everyone must participate," and that it was vital to invest training dollars for the long term.

In particular, several interviewees expressed concern that many employees, including management, were uncomfortable with the level of math skills required for basic statistical process control (SPC) techniques. As a solution, several of these organizations developed core math courses so that any employee can brush up or learn new skills. In the area of human relations, the interviewees recognized that a majority of the workforce has limited experience in group dynamics; hence, several in-house education and training institutes to teach team-building and workgroup skills were also developed, and are detailed in Chapter V.

"Just-in-time training" was offered as a result of a lesson learned by several interviewees. Several interviewees learned that the number of people trained is not as important as facilitating follow-up application. Teaching the right material at the right time to the right people with the right follow-up, optimized training efforts because "decay from the classroom to the workplace" easily happened without immediate practice and coaching. For example, at one organization, all supervisors were trained in basic statistical process control techniques, but only a few were actually transferring these new skills to the workplace. A lesson learned was that this organization did not have a sufficient number of trained facilitators or coaches to guide the initial transfer of skills to a real process.

Similarly, one interviewee learned that "lots of philosophy without the tools" fails to transform the workforce. In one particular organization, most training associated with TQM concerned philosophy and not basic SPC; when transformation of the workforce failed to occur, the interviewee evaluated his situation and determined that he had emphasized awareness training to the detriment of skills training. Thus, some interviewees remarked learning that they could not not simply train employees, sit back, and wait for results--TQM requires active, persistent leadership with plenty of guidance and expectations from top management, in order to succeed. "Top management must insist on the transfer of principles to jobs."

d. Performance Evaluation

Four of ten interviewees reported current performance appraisal systems as contrary to TQM principles. Points made against current systems included that they:

encourage competition between individuals resulting in a divisiveness which fosters "suboptimization of the organization's goals;" decrease objectivity because an employee's performance is often inextricably linked to systems and processes outside his or her control; and, demoralize employees by damaging self-image and self-esteem. Overall, current systems were seen as "hamper(ing) efforts to change." While most interviewees confessed not having any solutions to the negative effects of individual performance evaluations, two organizations had actually rewritten job descriptions to align with organization-wide objectives, as opposed to divisional or departmental objectives.

Three interviewees were participating in an experimental performance appraisal system, called PACER SHARE, which aims to research the viability of a performance appraisal system without individual performance evaluations. Another interviewee was aware of an experimental project in DOD, but did not know whether it was being developed in accordance with TQM principles. Performance evaluation also led to questions concerning promotions and career development based on TQM principles. In some organizations, the number of job classifications had decreased, as a method of retaining flexibility by increasing the number of skills required for promotion or pay increases. Further discussion of alternative performance appraisal, recognition and award systems is contained in Chapter V.

e. *Resistance to Change*

Resistance to change was the obstacle to TQM implementation most frequently cited, by nine of the ten top executives. Examples of this resistance included: "people think TQM is a program, not a philosophy;" people have "too much to do"

because they see quality as an addition, and not part of, their jobs; and senior and middle management "have the most vested in the old system." For example, one interviewee commented learning that in his engineering oriented organization, the engineers' preference for articulated, well-planned "final answers clashed with the continuous improvement orientation of TQM." While this top executive had not completely facilitated a behavioral transformation, the most common methods recommended by him and other interviewees to overcome this resistance to change were persistence, leadership, education and training. According to another interviewee, "since TQM is people-dependent" leaders must spend time on reducing fear, and increasing communication skills and empowerment in order to affect change. These areas are discussed in more detail below.

(1)   Reducing Fear

Fear demonstrated by the workforce was seen as reality-based given the "crack the whip" mentality which has, historically, been the method by which senior leadership achieved success. Methods recommended to dissolve fear included: effective communication, sharing power and information, and prompt decisions on process action team recommendations. Most importantly, interviewees reported learning "the hard way" that actions truly speak louder than words. In fact, one interviewee professed a talent for leadership based on fear. During his TQM implementation, this interviewee could not keep himself from screaming "Just do it!" when faced with urgent requirements. He learned that his innate ability "to blow off steam" clashed with the more active listening role and patiently persistant behavior as a foundation for transforming the workforce.

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Another interviewee accepted a recommendation from a process action team to alter the existing structure of the organization with the goal of improving customer service. While this top executive personally believed that changing structure was not the only or best answer, he quickly took action to accept the recommendation, thereby supporting the new change process and easing fear of change.

Several interviewees also expressed past frustrations at supervisors and middle management, some of which had actually tried to block initial TQM efforts on the front-line, due to fear and lack of understanding. However, these same interviewees also learned that vestiges of fear can only be extinguished by top management commitment, education and training, and better communication. At one organization, however, the top executive could not persuade one particular middle manager to embrace TQM as a way of business. In this case, the manager was evaluated on new performance criteria based on organization-wide objectives; the intermediate result was declining performance evaluations as well as uncooperation and stagnation within his department. During the interview, the top executive felt that if the middle manager could not change soon, he would ultimately be replaced.

For several interviewees, another way to confront fear of change was a "significant, emotional event;" in several cases, job security in the shrinking federal sector provided a successful focus to achieve easier acceptance of TQM for organizational survival. In one example, the top executive promised no one would work themselves out of a job; as long as the organization continuously improved and operated competitively, excess personnel would be kept on to participate in continuous

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improvement tasks. However, in yet a different organization, fear of organizational survival grew uncontrolled because top management failed to communicate its future intent to the workforce; results included a workforce intensely agonizing over job security and not primarily focused on quality.

(2) Communication

All interviewees advocated improving communications as part of their TQM implementation. Strategy formulation, and vision and values statements were manifestations of top management's early commitment to TQM. Other interviewees recommended "open-door policies," while vision and values were viewed as a "critical, unifying dimension" for communication. One interviewee described formation of a communication process action team requested by his employees. Consisting of the commanding officer, executive officer and other senior leaders, this team's purpose was to improve all methods of communciation to the workforce. Overall, less emphasis was placed on traditional, formal methods of communication such as Captain's Call; instead, communication mechanisms such as management by walking around, group or peer-to-peer awards, and various types of luncheons, newsletters and other written media were reported. Innovative ideas in recognition and communication in support of TQM are discussed in Chapter V.

(3) Empowerment

"Unleashing the workforce" was of prime concern to the interviewees, who believed that building team spirit, "coaching as opposed to cracking the

whip," and higher levels of employee involvement were keys to empowerment. Responses ranged from "building team spirit to strengthen camaraderie," to competition for quality awards as a way to strengthen both self-assessment and team spirit. While varying in name, number and structure, work groups such as executive steering committees, quality management boards and process action teams were viewed by all interviewees as allowing employees fuller participation in organizational processes and goals. Autonomous or self-managing work teams were discussed as experiments at three of the participating organizations as efforts at empowering the workforce, and are more fully described in Chapter V.

f. Relentless Pursuit of the Quality Transformation

Five of the ten interviewees identified persistence in pursuit of their quality transformation as mandatory for long term success. Besides "relentless," other adjectives to describe management efforts included "ruthless," "exhaustive," and "never-ending." Most interviewees were well aware of other TQM success stories, often through active participation in local area improvement councils. Sharing experiences was promoted by top management at several organizations in order to "sustain momentum" and enrich their organizations. Interaction with customers and vendors was also seen as "broadening quality perspective and achievement." For example, several interviewees used customer liaison roles and customer education as methods to achieve customer satisfaction; these topics are discussed later in this chapter.

In another vein, reaching "critical mass" was brought up by two interviewees; they learned it took a lot longer than they thought, and that even if pockets

of model TQM units existed within their organizations, "true acceptance by the critical mass" is much more difficult to achieve. Although critical mass is a dynamic and somewhat elusive quality, all except one interviewee felt confident of having achieved or knowing when he would achieve this level of support. The solution is a transformation strategy which is "patiently impatient." One interviewee's solution to resistance to change--involving the entire workforce--sounds simple but provided him with a never-ending challenge, "no matter how long it takes."

2. Organizational Structure

Nine of ten interviewees answered affirmatively in response to the second interview question:

- "Has your organization changed at all structurally as a result of your TQM implementation?"

Descriptions of actual changes fall into three categories:

a. *Flattened Structure*

Six of ten interviewees reported flattening of existing organizational structure during or before TQM implementation. Two organizations reduced the number of supervisors by 27% and 40% during organizational streamlining. Another organization experienced a flattening from six to three management layers across its entire organization. Yet another organization reorganized from 12 to seven departments and from four to three directorates, while keeping excess personnel onboard for process improvement tasks.

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b.   *Functional to Product Orientation*

Four of ten interviewees, a majority from engineering-based organizations, described a complete reorganization of work based on "mini-factories."   All three organizations have participated in a move away from functional work arrangements toward product teams.   Traditional functional structures are characterized by hierarchy, routine tasks and a relatively stable environment, while product or project orientations tend to be more flexible and decentralized; for example, at one organization, "level of control for product line structure belongs to the product line manager."

c.   *Self-Managed Work Teams*

Three of ten interviewees described an alternative work structure currently under experimentation and use--self-managed work teams.   At one organization, self-managed teams develop their own work schedules and manage resources including annual leave.   At another, self-managed work teams were viewed as another move toward empowerment, as opposed to more traditional methods to move decision-making down the hierarchy.   Self-managed work teams are further discussed in Chapter V.

3.   Strategic Planning and Implementation

No interviewees described separate strategic and quality plans currently in existence in answer to the third interview question,

- "Does your organization have a strategic plan/strategic quality plan?"

In fact, only two interviewees started TQM implementation with quality fully integrated with the organization's strategic plan. Eight interviewees noted starting TQM implementation with separate documents on strategy and quality.

One organization described the importance of an integrated, living strategic document. Currently under development, this document will contain organizational vision and plans for finance, capital assets, marketing, customer service, among other areas, for the next one to five years. Other organizations also stressed the importance of spending adequate amounts of time and focus on the strategic planning process. For example, one organization conducted numerous planning sessions of full and half-days over a three month period to develop its strategic plan. Another key point for successful implementation was described as including the right people in the whole strategic management process; for example, one organization invited its labor unions to join its strategic management board as of August 1, 1991.

4. Customer Satisfaction

Interviewees offered various internally and externally oriented practices in response to:

- "How does your organization identify, measure and track customer satisfaction?" Externally oriented practices included: customer evaluation cards distributed with products, customer surveys, customer liaison roles, customer education, and official deficiency reports. Internally oriented practices included: formal employee attitude surveys and listening as an information-gathering tool.

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a. *Customer evaluation card distributed with the product*

For those organizations with a physical ouput, one method of eliciting customer feedback is a self-addressed, stamped customer evaluation card packaged with each product, which gives the name and telephone number of the technician who repaired or produced it. A similar practice uses stickers attached to all outgoing products with a phone number to call if the customer experiences a problem. On a larger scale, one organization sends a personal letter from its commanding officer with each aircraft it fixes, also with a name and telephone number for questions or problems that the customer experiences. At another, jet delivery is accompanied by a personal phone call from the commanding officer to the squadron commanding officer as a warranty to fix any problems "on the spot."

b. *Surveys*

Four organizations used surveys as an additional method of eliciting customer satisfaction. These surveys ranged from periodic to annual, and from an all inclusive customer list numbering 800 to a random sample of the same number. Surveys were viewed as a viable method to gather a broad base of customer feedback while also providing a baseline for continuous improvement. A caution about surveys was suggested by one interviewee who felt that surveys failed to gather the kind of honest, detailed response which he felt was more easily achieved using the methods listed below.

c. *Customer Liaison*

Four organizations utilized some sort of customer liaison role to interact with customers. Two organizations have liaison programs that either physically bring their production and planning personnel to operating squadrons in order to determine customer desires, or actually establish an on-site representative at the customer's location. This liaison role brought up an interesting dilemma in satisfying numerous, and often competing customers, who provide conflicting requirements. A common example mentioned by the interviewees was the situation where the end-user of the product or service does not control the financial resources to pay for the product or service. No interviewee had an easy solution to this problem, except to "get close to all the customers" and facilitate the customers getting close among themselves.

Face to face communication was advocated by nine of ten interviewees as a method to get closer to the cutomer. Such communication manifested itself in a variety of forms. The interviewees prescribed lots of "face time with customers," "customer meetings and working groups," "person to person interviews," and "customer involvement during program reviews."

d. *Customer Education*

Two interviewees specifically felt a responsibility to educate their customers as part of their TQM implementation. One organization developed a customer education team which travels to the customer. On the other hand, another organization conducts its customer visits on its own site, so that its customers can become educated

about its capabilities and processes. This sharing of information is aimed at improving customer relationships and sharing information, with customer satisfaction as its goal.

e. *Official Deficiency Reports*

Six of ten interviewees relied on formal deficiency reports submitted by the customer as another method to measure customer satisfaction. One interviewee recommended a single point of contact for handling this type of report. Other interviewees commented on the customer's willingness to accept mediocre results due to the time and effort required to process a complaint. However negative in content, this type of feedback was viewed as invaluable in looking for trends in output. Interviewees also agreed that this passive method of eliciting customer satisfaction should be supplemented by other, more active methods.

f. *Employee Attitude Surveys*

Six of ten organizations used surveys to elicit internal customer satisfaction. Four of these six organizations concentrated on QWL issues, while the remaining two organizations also used employee attitude surveys to gather information for improving recognition systems, communications and use of personal computers. Only two of the six organizations actually referred to "assessing climate" or using attitudinal surveys as a "corporate barometer."

g. *Listening*

Two of ten interviewees advised better levels of communication and listening to identify internal customer satisfaction. While subjective in nature, several

interviewees relied on management by walking around in order to gain verbal feedback from employees as evidence of changed behavior. One interviewee illustrated employee support of organization-wide goals with the following story. While walking around his organization's work spaces, he saw a group of employees taking a break. The supervisor, unaware of his presence, announced to his team that it was time to get back to work, with a reminder that "lives depend on us." This interaction was viewed as evidence of changed behavior, and of individual or group goals aligned with organizational objectives.

5.   Quality Assessment

The following question was perhaps the most difficult for the interviewees to answer:

• How does your organization identify, measure, and track results of quality efforts? The interviewees' responses fell into two camps--one group using a hierarchy of indicators, the other group gathering information "by the seat of the pants." One interviewee called for a more holistic focus as compared to the external performance indicators, required by higher levels within DOD, and upon which his organization's performance is externally evaluated; but, he had no answers for his own organization. One common complaint was the conflict between external indicators, often not quality-oriented, and internal indicators focused on customer satisfaction. Several organizations used the Malcolm Baldridge National Quality Award criteria as a basis for self-assessment of organization-wide quality management, but not specifically as a tool for developing a hierarchy of indicators.

a. *Hierarchy of Indicators*

The interviewees did agree on customer focus as a basis for quality indicators. One interviewee described looking at private sector industry indicators to form his organization's own indicators. Another interviewee, from an organization with a physical output, recommended using constraint indicators such as work in progress and throughput as discussed in The Haystack Syndrome by Eli Goldratt (1986). From a logistics organization, one interviewee recommended a quality indicator based on training and use of team-building concepts in day-to-day work.

Several organizations use a hierarchy of indicators to assess overall quality performance. In particular, one organization uses performance measures such as quality of products and services, customer satisfaction and fleet readiness, employee satisfaction, resource management, financial health and innovation. Still another organization described using existing information resource systems as a source for seven performance indicators based on the work of Scott Sink. These indicators are: effectiveness, efficiency, quality, productivity, quality of work life, profitability, and innovation (Sink, 1984). While these seven indicators are not mutually exclusive in quantifying organization performance, one key point is that productivity is not the most important or critical element in determining overall quality.

Sink's third indicator--quality--was viewed as the most difficult subject to measure. Cost of quality or lack of quality is still being being developed as a quantifiable indicator of performance; however, so far, the cost of not doing quality work or not providing TQM training has eluded quantification.

b. Seat of the Pants

Other measures of quality which were recommended by the ten interviewees included perceiving a feeling of team commitment with proof in changed behaviors. Employees' candidness during meetings was seen as a prime example. Other subjective methods used were professional knowledge, judgment, and improved performance noted by producing a better product for the same dollars.

B. SURVEY

The purpose of this section is to summarize results from the surveys of the ten organizations' executive steering committees. Table 6 shows the means and standard deviations for the eight critical factors of quality management (Saraph et al., 1989; Saraph, 1991). They provide a profile of organization-wide quality management for these participating DOD organizations in the present study. For comparison, corresponding data are also shown from an earlier study of private sector firms (Saraph et al., 1989). Within the DOD sample, five of the eight critical factors had an average score above the midpoint score of three. Ratings were made on a scale of one to five with five being a strong indicator of a given quality feature. The three most highly rated factors were role of the quality department ($\bar{x}$=3.99), role of management leadership and quality policy ($\bar{x}$=3.72), and training ($\bar{x}$=3.70). Three critical factors--supplier quality management ($\bar{x}$=2.50), process management ($\bar{x}$=2.86), and quality data reporting ($\bar{x}$=2.91)--scored below the midpoint score of three.

Table 6: DOD/PRIVATE SECTOR SURVEY RESULTS ON THE CRITICAL FACTORS OF QUALITY MANAGEMENT

Critical Factor (adapted from Saraph et al.,1989)	(DOD)			(private sector)		
	mean	stdev	n	mean	stdev	n
Role of management leadership and quality policy (scale #1)	3.72	.59	102	3.19	.76	161
Role of the quality department (scale #2)	3.99	.52	102	3.40	.75	94
Training (scale #3)	3.70	.57	102	2.51	.67	161
Product/service design (scale #4)	3.32	.57	102	3.07	.61	158
Supplier quality management (scale #5)	2.50	.66	102	2.81	.67	157
Process management (scale #6)	2.86	.47	102	2.89	.51	155
Quality data and reporting (scale #7)	2.91	.70	102	2.71	.72	158
Employee relations (scale #8)	3.36	.56	102	2.66	.68	160

These data support the information gathered during the interviews. (See Table 4 for the component items for the eight critical factors surveyed.) In light of the interviews and documentation, the ten DOD 'exemplar organizations' have spent most of their time on 'first steps' in the areas of: quality as a part of every employee's job, top management leadership and commitment, and training. In the lower rated factors of supplier quality management, process management, and quality data and reporting, data collected from the interviews and documentation also support these findings. For example, the amount of quality education provided to suppliers, technical assistance provided to suppliers, and

involvement of suppliers in the product/service development process were limited or non-existent. In addition, the degree of automation in the inspection process,clarity of instructions given to employees, and "fool-proof" designs were either being worked on or non-existent. For quality data and reporting, the interviewees had particular difficulty specifying cost of quality data, let alone its availability to employees within their organizations. As a final point, the lowest rated factor of supplier quality management is an area which several organizations had taken active steps to improve, although the majority of participating organizations did not focus on this area or had emphasized internal customers rather than external customers.

Some caution must be exercised in comparing public (DOD) and private sectors using this data, because neither this thesis choice of organizations or the original survey sample (Saraph et al., 1989) are random samples. The original private sector study selected businesses in the Minneapolis area with more than 1000 employees (Saraph et al., 1989). While 3-M and Control Data participated in the original study, and are well known for their innovative quality programs, the total sample for that study was not chosen because of exemplary quality management. This thesis design purposefully selected DOD organizations actively practicing TQM without regards to the number of employees.

With these cautions in mind, the sample response of DOD organizations was compared to the private sector sample in terms of means and standard deviations for the eight critical factors (Saraph, 1991). The exemplar DOD organizations scored higher on six of eight factors as compared to the convenience sample of private sector firms. This

suggests that DOD organizations can achieve a quality focus that is comparable to the private sector. The only factor scored lower by the ten DOD organizations was supplier quality management. One possible explanation is the myriad of complicated rules which apply to public sector contracting in order to promote fair competition.

V. INNOVATIVE PRACTICES

The data collection associated with this research design included interviews, a survey questionnaire and other supporting documentation. From these sources, a variety of issues emerged that have implications for future practice, such as innovative "best practices" or unique perceptions which might be useful to other organizations implementing TQM. Specific practices are identified by organization, with points of contact noted in Appendix C. Issues in this chapter are separated into five sections on strategic planning and implementation, self-managing work teams, training, recognition and reward systems, performance appraisal systems, and communication.

A.   STRATEGIC PLANNING AND IMPLEMENTATION

1.   Process

The Naval Ships Systems Engineering Station (NAVSSES) in Philadelphia, Pennsylvania provided an easy to understand framework for their strategic planning and implementation process. This particular organization uses a top-down, participative approach, with a large group consisting of approximately 70 management personnel, in order to arrive at a consensus. The framework relies on Shewhart's Plan-Do-Check-Act cycle, espoused by W.E. Deming among others (Deming, 1986), and is shown in Figure 2. During the "plan" phase, an organizational systems analysis is completed, strategic objectives (long term) and tactical objectives (short term) are determined, and the

implementation is planned. The "do" phase involves actual implementation, while the "check" phase relies on performance measurement. Then, during the "act" phase, an implementation review is conducted and the entire process is evaluated for improvement, thus informing revised planning and a continuation of the cycle. The iterative nature of the Shewhart Cycle is particularly well suited to strategic planning in the public sector. As discussed in Chapter II, the strategic quality plan can be developed in a flexible and incremental manner in order to succeed with implementation in a complex decision-making environment.
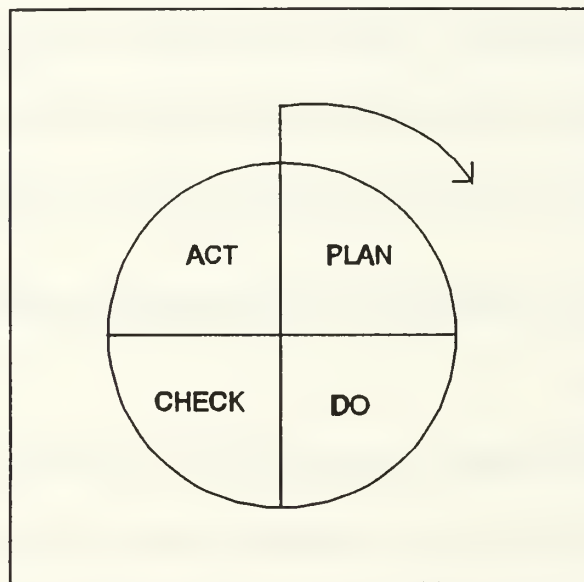

Figure 2: Shewhart Cycle

2. Bill of Rights

Three organizations promote a "quality bill of rights" as a firm foundation for the paradigm shift to quality (QIP 3, 5, 6; 1991). For example, the Sacremento Air Logistics Center (SM-ALC) uses this document to build a foundation of trust so that

responsible actions can contribute to safety, quality and productivity. These rights include: the right to challenge business as usual; the right to be heard; the right to expect commitment to quality; the right to place quality before production; and, the right to feel genuine pride in their products and services.

In addition, SM-ALC complements their Quality Bill of Rights with their Supervisor's Code of Professionalism. This code serves as a philosophy of ethics and outlines "the behaviors employees should expect from their supervisors as well as the behaviors supervisors should expect from themselves." The major elements of the Supervisor's Code of Professionalism are: provide leadership, demonstrate followership, communicate understanding, demonstrate integrity, and foster team participation. Taken together, the principles contained in these two documents can create the internal customer focus envisioned by the strategic plan. (QIP 5, 1991)

B.   SELF-MANAGING WORK TEAMS

The top executives at the Naval Avionics Center in Indianapolis, the 1926th Communications-Computer Systems Group (CCSG) at Warner Robins Air Base in Georgia and the Aviation Supply Office (ASO) in Philadelphia all explained implementing self-managing work teams as an attempt to improve quality, productivity and QWL. Self-managing work teams are thought to more effectively allocate resources in order to deal with variance in work conditions (Trist et al., 1977). Typically, team members have a variety of skills relevant to the group task as well as discretion over task assignments and work schedules. In this way, self-managing work teams attempt to place a high degree

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of "decision-making autonomy and behavioral control" at the workgroup level (Manz and Sims, 1984). The three organizations with self-managing work teams have little evidence of success due to the short life span of these experimental teams. While these teams have not spread to their entire organizations, the interviewees expressed satisfaction with current progress and interest in continuing the experimental teams.

Private sector successes have already been documented in autonomous work groups (Manz and Sims, 1982; Myers, 1985; Poza and Markus, 1980; Trist, Susman and Brown, 1977; Walton, 1977; Wall et al., 1986). Positive results include: a substantial and lasting effect on employees' intrinsic job satisfaction, improved productivity through elimination of supervisory positions and higher levels of employee involvement and participation. A recent survey of Fortune 1000 firms showed 28% of the businesses using self-managed work teams and 23% planning to implement them through 1991 (Cohen and Ledford, 1991). Even if the public sector lags the private sector in innovative practices, self-managing work teams and new leadership skills seem to be a wave of the future in task design.

One implication is that future leaders may become those individuals who actually facilitate self-managing work teams to lead themselves. This change in the role of managers/leaders also entails a new look at desirable leadership behaviors, such as exercising influence through how the manager frames group tasks, structures the group, and helps the group to get started and headed in the appropriate direction (Hackman, 1987, p. 338), instead of traditional autocratic roles.

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C. QUALITY MEASUREMENTS

1. The Management Healthcheck

At NAC, an internal, self-evaluation tool was developed to assess how organizational principles are being used to create an environment of continuous improvement. At the customer's (manager's) request, the Management Healthcheck Team conducts a review of his/her organization unit. Data is collected from employee interviews, statistical data, customer and supplier surveys, and employee questionnaires. Feedback results provide the manager with information for identifying personal development needs and development needs of the unit. (QIP 2, 1991)

2. Supplier Quality Management

Informally known as the Blue Ribbon Contractor program, measuring suppliers on the basis of quality, on-time delivery and cost has improved overall quality performance. At NAC, the program allows awarding contracts to other than the lowest bidder, if the contract is awarded to a contractor with exemplary performance and if payment of such a premium is determined in the government's best interest. Results include a delivery rate of most frequently used blanket purchase agreements (BPA) decreasing from 68% to 15%, while receipt of defective lots also decreased from 11% to 6% (QIP 2, 1991). The SM-ALC has also formalized the contracting officer's authority to exercize professional judgment in awarding price differentials on contracts from ten to 20% (QIP 5, 1991).

D. TRAINING

1. Exposure

Education and awareness of TQM principles and quality practices were instituted in a variety of forms across the ten participating organizations. Several organizations have developed extensive video libraries. At NAVSSES, the video library contains 76 titles by experts such as Peters, Kanter, Conway and Deming; they are shown in departmental training or at lunchtime in a discussion-oriented session. In addition, the videos are available on loan for home-viewing by any employee (QIP 10, 1991).

At the Naval Supply Center (NSC) in San Diego, California, managers have participated in the "Masters of Excellence" program, which features live presentations from America's top consultants in the quality arena. At SM-ALC, education is also enhanced by satellite transmissions of quality seminars (QIP 5, 1991). Another way to gain exposure to quality practices is rotational assignments. At NAC, managers are temporarily assigned to NAVAIR headquarters for a three to nine month period, during which they absorb quality practices in use at a variety of other successful organizations (QIP 2, 1991). "Lunch and Learn" sessions were a successful way to expose employees to TQM at the Navy's Aviation Supply Office in Philadelphia, Pennsylvania. Completely voluntarily, employees can attend educational sessions conducted by the organization's executive steering committee members, with follow-on discussion of quality topics (QIP 7, 1990).

2. Learning Centers

Several organizations have created learning centers to faciltate TQM education and new skills training. At SM-ALC, the Team Building Center's goal is to promote employees' exercise of "self-direction." The Center's learning sessions focus on "experiential interaction" in the following areas: common ground, committed action, communicating openly, collaboration vice competition, customer focus, and clear goals and roles. Each session introduces 20 member work teams to a systematic approach to seek out, understand and satisfy internal and external customers' needs and expectations. (QIP 5, 1991) Other examples of learning centers are the Computer Information Center at NSC and the Learning Center at ASO. The ASO has doubled training dollars expended over the last few years on orientation to TQM concepts and SPC targeted at the entire workforce, statistical analysis, and in-house facilitator and instructor training. NSC also expanded into personal computer training in "Statistical Process Control for TQM" and "Easy Flow," a flowcharting software package. (QIP 3, 1991; QIP 7, 1990)

3. Competency Based Certification

Competency based certification, developed by NSC, identifies skills, competencies and tasks of an occupation, and designs a structured training program to ensure that the employee can perform his/her job. Formal classroom training is accompanied by on-the-job certification, with tracking of employee certification status accomplished electronically. Upon completion of certification, an employee receives a pin and certificate from the commanding officer. (QIP 3, 1991)

At NSC, training is based on the idea that, "the best vehicle to understanding a particular concept is to be required to teach it to someone else." With this in mind, all course materials have been developed in-house for supervisor training, employee training and facilitator training. A comprehensive list of these and other course materials is contained in Appendix D. Sharing this wealth of information is possible, in part, through the Competency Based Certification Library at the Fleet Material Support Ofice (FMSO) in Mechanicsburg, Pennsylvania. FMSO retains copies of TQM instructor guides, student guides, viewgraphs, and other course material from NSC developed courses. In addition, NSC has developed a role for "cadre" instructors who teach NSC courses at the request of other activities. The cadre instructor concept has increased the level of self-development and knowledge of the participants by enabling them to become masters of certain types of training materials. (QIP 3, 1991)

E.   RECOGNITION AND REWARD SYSTEMS

There is no one best set of reward practices because it is impossible to design an effective reward system without knowing the other features of the organization. The ultimate goal is to develop an integrated human resource management strategy that encourages appropriate behaviors and attracts people with the right skills (Lawler, 1987, p. 270). Examples of successful recognition and reward systems for the participating organizations discussed below were a result of dialogue from many levels within each organization, in order to improve existing systems.

1. New Ideas

Several organizations provided innovative examples of recognition and reward systems. In terms of new ideas, NAC's Better Idea Program allows employees to submit job-related improvement ideas they can implement themselves. The Better Idea Program provides an avenue for new ideas which are not covered by the official Beneficial Suggestion program which only rewards ideas that are not related to the employee's normal job (QIP 2, 1991). Similarly, NAVSSES' Bright Idea Program focuses on small improvements or little steps that make up the continuous improvement process (QIP 10, 1991). At SM-ALC, the Good Ideas for the Taking (GIFT) Program also elicits employee suggestions which can only be disapproved at the top management level (QIP 5, 1991).

The 'Order of the Skunk' is another method used at NAC to recognize individual or team ideas relative to research, engineering, quality, manufacturing or production support functions. In addition to admission to the 'Order,' rewards include a reserved parking space, certificate, jacket patch and coffee cup (QIP 2, 1991). The SM-ALC also seeks innovative ideas through it's Top Brass In Box program, which allows for improvement suggestions directly to the top executive, and the Director's Hotline, which consists of an answering machine for anonymous suggestions (QIP 5, 1991).

2. Special Acts

At NAVSSES, the Special Act Program covers instances of one time awards for individuals or groups who benefit the entire organization. Rewards include cash or letters of appreciation, and are the principle, formal method for recognizing teams. At ASO, the "Unsung Hero" award provides a way to recognize individual or group

contributions to getting the job done, for those groups or individuals that do not typically have much organizational visibility (QIP 7, 1990).

3. Peer to Peer Recognition

At ASO, groups or teams can award other groups or teams for excellence in customer and supplier satisfaction. Actual rewards include a plaque, engraved with the team's name, placed in ASO's Hall of Fame along with a presentation in front of the entire workforce (QIP 7, 1990). The ASO also uses its "You Made a Difference" program as a method of peer to peer awards. The recommending employee's work group must agree on the award, which manifests itself as a standing ovation by his/her peers. In addition, a certificate is presented, photographs taken, and a lottery ticket issued for Recognition Day. At NAVSSES, "Pride in Performance" (PIP) is yet another good example of providing "on the spot" peer recognition for contributions. Any employee may award another with a PIP button, regardless of organizational level or location. Its purpose is to inspire cooperation and teamwork among peers (QIP 10, 1991).

4. Ceremonies

One visible method of awarding employees is ASO's Recognition Day, a biannual celebration of employee contributions. For example, special prizes are awarded to randomly drawn contributors to previous awards such as the "You Made a Difference" program. Rewards include lunch with the commanding officer, acting as the commanding officer for a day, reserved parking, or a pass to the fitness center (QIP 7, 1990). At

NAVSSES, public recognition is also of prime concern, as evidenced by monthly Awards Ceremonies hosted by the commanding officer (QIP 10, 1991).

5.   Productivity Gain Sharing

Rewards can be based on job position, skill or performance. Typically, government organizations base rewards on a combination of job position, seniority and individual performance. Organizations attempting to reward behaviors congruent with organizational objectives tend to base rewards on either skills or performance (Lorsch, 1987, p.260). A strength of skill-based rewards is that it communicates to the employee an organizational concern for his/her personal development. Two important points concerning performance-based rewards include: individuals are usually more satisfied when they perceive rewards based on their performance; but, as people are aggregated together to measure performance, group performance begins to overshadow the individual (Lawler, 1981).

With this background, several participating organizations currently utilize productivity gain sharing (PGS) as an employee involvement program aimed at aligning individual behavior with organizational objectives. At NADEP, Norfolk, NADEP, Cherry Point and SM-ALC, productivity gain sharing provides a means for the government to share with employees savings from improved performance (QIP 4, 1990; QIP 5, 1991; QIP 8, 1987). At NAVSSES, a feasibility study is currently being conducted on introducing PGS as an additional method of employee involvement (QIP 10, 1991).

Productivity gain sharing has a strategic basis because gain sharing should contribute to achievement of one or more strategic goals. Four keys to a successful PGS

program include: defining the organization's strategic objectives, devoting sufficient resources to feasibility assessment and plan design, commitment to the concept at all managerial levels, and effective implementation. Studies also indicate that organizations which approach gain sharing strategically and incorporate it as a managament philosophy are more likely to succeed. Those organizations seeking major cultural change should include all employees, since this strategy's message is that all employees must work together to achieve the organization's objectives. Tailoring the PGS plan to an organization's strategy and structure also increases the probability of success, (Schuster, 1987) while fostering a strong motivation to swiftly deal with changes in organizational structure, design of work and additional training programs (Lawler, 1987, p. 267).

F.   PERFORMANCE APPRAISAL SYSTEMS

1.   Alignment

Many interviewees agreed to the inadequacies of current performance appraisal systems;   several had created useful tools to improve such evaluation. At NAVSSES, management encourages supervisors to include continuous improvement in performance plans. In addition, continuous improvement is a factor in all selections for supervisory and management positions filled under the Merit Staffing program (QIP 10). At ASO, managers use a common work plan and objectives based on the five goals of its strategic plan. Then, the commanding officer rates unit performance on the work plan in terms of the impact on the organization's overall performance and achievement. Using these two steps, ASO is able to rate its managers (GS/GM only) as a team (QIP 7, 1990).

Similarly, NAC's Performance Management Recognition System for managers ties performance evaluation to customer satisfaction and NAC's internally developed leadership principles (QIP 2, 1991).

2. PACER SHARE

Three of the participating organizations are involved in a revolutionary performance appraisal experiment. A five year demonstration project by OMB, PACER SHARE gives waiver authority over civil service personnel regulations in order to increase productivity. So far, SM-ALC has saved over $3.4 million with a total productivity gain share of $1361 for each of 1311 participating employees. This example at SM-ALC included early and total involvement of labor unions and also originated the idea of team-building training, now an integral part of the organization's training strategy.

The PACER SHARE program recognizes deficiencies with current appraisal systems and incorporates specifics interventions to enhance productivity, increase flexibility, improve quality and timeliness of work, and enrich quality of work life. There are five specified interventions to achieve these goals: job series consolidation, pay banding, revised supervisory grading criteria, revised hiring and retention criteria, and productivity gain sharing. At SM-ALC, the experimental division has no individual performance appraisals, job series have been consolidated from 66 to six process descriptions, and employees have greater latitude to design jobs and reorganize functions. Formally initiated in 1988, current success in this program is paving the way for considering wider application in the federal sector. (QIP 5, 1991)

G. COMMUNICATION

1. Written Media

Many of the organizations participating in this study used a variety of written media to improve communications throughout their organizations. For example, NAC employs "Ask the Skipper" cards to elicit questions and comments from employees; answers by top management are printed in the command's newspaper (QIP 2, 1991). At ASO, "CO-grams" or one page letters from the commanding officer are used to communicate quality issues (QIP 7, 1990). Norfolk Naval Shipyard has a quality corner in its base paper, while NAVSSES' paper has run a series of articles on quality (QIP 9, 1988). The NAVSSES actually uses its newspaper to report results of using TQM on specific technical processes, as well as feature articles on process action teams (QIP 10, 1991).

2. Electronic Mail

Electronic mail is quickly becoming an innovative source of communications ideas. At ASO, executive steering committe minutes are sent electronically to all supervisors, on a weekly basis. On a larger scale, SM-ALC's 15,000 employees have access to their Distribution Cable Network, which allows for "newsbreaks" on monitors located throughout the organization (QIP 5, 1991).

3. Meetings

The ASO uses biannual "All Hands" meetings to communicate top management expectations and information to the workforce. Additionally, ASO has

eliminated Friday meetings from its managers' schedules, in order to encourage the practice of managing by walking around (QIP 7, 1990). At SM-ALC, another unique meeting idea is for front

line employees to meet with trainees during team building sessions, in order to provide first hand description of success stories (QIP 5, 1991).

4.   Behavioral Feedback

The ASO used an outside contractor to facilitate an increased rate of behavioral change within its organization. The "Behavioral Feedback System" involved supervisors and managers in a critique of their own behavior, in the spirit of aligning their actions with continuous improvement and empowerment ideals. Subordinates were interviewed about specific supervisor or managerial behavior. Facilitators provided feedback to these supervisors and managers and helped them develop a plan to change their behavior (QIP 7, 1990). According to the top executive, this intervention was the most successful in quickly changing individual behavior, but was also quite expensive; similar in-house practices are under development.

5.   Mentoring

Only one organization explicitly described improving employee career development through improved communication. The ASO's strategic plan for 1989 delineated its fifth strategy as "Moving Organization and Human Resources into the Future" with a supporting objective to establish and implement a formal career counseling and mentoring program. This program provides a source of one-on-one guidance and

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advice from senior people (mentors) to mid-level employees. Mentors coach employees about how to become qualified and competitive for promotion (QIP 7, 1990).

VI. CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL LESSONS LEARNED

The six areas of lessons learned by top executives during TQM implementation, as discussed in Chapter IV, were also compared to DOD's recommended TQM principles and practices. These six areas include: top management commitment, a structured approach, training and education, performance evaluation, resistance to change, and relentless pursuit of the quality transformation. The purpose of this comparison was to see what recommended principles and practices were emphasized by the exemplar organizations.

The TQM principles define the fundamental concepts that "shape and guide TQM," serve as basic rules and guidelines for management decisions, and provide a framework used to "form expectations and judge behavior." Basic TQM principles include: continuous process improvement, process knowledge, user focus, commitment, top-down implementation, constancy of purpose, total involvement, teamwork, and investment in people (Total, undated). The lessons learned reported by the interviewees cover all of these TQM principles, illustrating the importance of these basic concepts.

Total Quality Management practices are based on implementing the guiding principles, demonstrating and reinforcing behavior through sytematic and continuous application, and these practices becoming customary and routine. They include: planning and goal-setting, promoting improvement, process improvement, signals, communication,

skill-building, resource optimization, and contractor improvement (Total, undated). While all of these topics were touched upon by the lessons learned, the level of excellence or maturity of implementation varied across the organizations. Those organizations which had more thoroughly approached all the recommended TQM practices seemed more successful at implementing TQM.

B.   THESIS RESEARCH QUESTIONS REVISITED

The primary research question is "What strategic issues must a top executive be concerned with to successfully implement Total Quality Management?"   Both the interview and survey results provide the answer.   The interview responses supplied lessons learned in six areas, including top management commitment, a structured approach, training and education, performance evaluation, resistance to change, and relentless pursuit of a quality transformation. In addition, the interview answers described other strategic issues, including changes to organizational structure, strategic planning and implementation, customer satisfaction, and assessment of overall quality efforts. Gaining top management commitment and training or educating employees were the two highest priorities during the early stages of TQM implementations at the DOD exemplar organizations. These emphasis areas are not surprising since reaching a "critical mass" of support is essential to sustain the momentum required by a shift to a quality focus.

A subsidiary research question is "How does one measure organization-wide quality management?" The interviewees' incomplete answers in this area suggest a difficulty in developing a tool for overall quality measurement.   The current state of quality

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measurements within DOD exemplar organizations can be characterized as less than mature. Some answers to this issue are noted through the way the exemplar organizations have developed process management skills and measurement as a foundation for improvement. However, the majority of participating organizations are still struggling to measure organization-wide quality management. What is missing in current quality measurement systems is a method to capture an overall assessment of an organization's quality management; for example, potential areas which need to be measured include cost of quality, quality of work life and innovation.

The survey instrument adapted from Saraph et al. (1989) may provide these organizations with additional diagnostic information for evaluating quality. Survey results also provided strategic insights to organization-wide quality management between public (DOD) and private sector organizations. While one study showed private sector organizations with a 3.5 year headstart in quality management practices (Johnston, 1989), this thesis survey indicates a higher perception of quality practices by the exemplar (DOD) organizations in all areas except supplier quality management and process management.

The third research question is "What kind of evaluation or feedback mechanism can help the top executive identify which issues are vital for a successful shift to quality?" The literature review and methodology chapter of this paper provide some answers. During the literature review, a previous private sector study was found which identified eight critical factors of organization-wide quality management (Saraph et al., 1989). As explained in Chapter III, operational measures of these critical factors can form a profile

of an organization's quality management prctices. In addition, a comparison of these
eight critical factors and the Malcolm Baldridge National Quality Award criteria showed
additional areas for evaluation--customer satisfaction and quality results. While both of
these tools can be used for self-assessment, one advantage of the critical factor-based
study is that the survey elicits individual perceptions of quality practices. Earlier
discussion of quality assessment indicated many interviewees used only their own,
subjective, "seat of the pants" perceptions in determining quality results.

The last original research question was "What kind of implementation plan is
needed?" Results from the interview show that a large majority of organizations started
implementing TQM without integrating their strategic and quality plans. In addition, most
organizations retained overlapping work groups in both areas of strategy and quality. As
described in Chapter IV Section 3, one lesson learned was that the top executive should
not separate quality from strategy--they must be integrated. Also, this author noted
subjectively that the organizations with more mature TQM implementations tended to
work more diligently in all areas, including training, leadership, process management, and
quality data and reporting. Less mature organizations tended to focus more narrowly on
QWL, training and top management commitment and education, as opposed to emphasis
on all aspects of their organizations.

C. SUMMARY

This thesis provides both quantitative and qualitative analyses of TQM
implementation in DOD. The research relied on personal interviews of top executives of

exemplar organizations in order to elicit lessons learned. In addition, a validated survey instrument was used to measure perceptions of organization-wide quality management by each organization's executive steering committee.

Research results included specific identification of lessons learned and innovative practices which may be useful to other organizations implementing TQM. Lessons learned and innovative practices may also serve as an aid for changing the way people behave, which is a "major driving force driving organizational performance" (Tichy et al., 1982). While the results provided answers to each of the original research questions posed in Chapter I, they also imply that TQM implementation is either never-ending or quite a long term commitment. All of the exemplar DOD organizations which have been practicing TQM for over three years still do not characterize themselves as mature implementors.

However, certain evidence is promising for organizations committed to quality. For example, a recent reduction-in-force (RIF) in the Naval Air Systems Command caused some of its business units to lose funding for up to 20% of civilian personnel. Two of the subject organizations, which also particpated in this study, were evaluated for cuts in human resources as a result of the RIF. One organization was subject to a cut of approximately 10%, while the other did not lose one employee. The implication is that the most successful organizations--those that focus on quality and customer service--will also be the ones best able to succeed in a turbulent and shrinking public sector.

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D. RECOMMENDATIONS FOR FUTURE STUDY

During this research, several issues emerged that could benefit from further study; they are:

1. Status of TQM in the DOD

This thesis provides a current look at DOD exemplar organizations which focus on quality; it reports lessons learned by top executives and innovative practices used to reach various levels of implementation maturity. Continuing research on the same organizations could provide valuable information as to resolving present issues or future problems yet to be encountered during a TQM implementation. Such research could also alleviate the lack of sufficient, long-term examples of TQM implementation in the DOD.

2. PACER SHARE

While still a demonstration project within the DOD, PACER SHARE has already achieved significant results in improving organizational performance by granting waiver authority over civil service personnel regulations. Further research on the five interventions of job series consolidation, pay banding, revised supervisory grading criteria, revised hiring and retention criteria, and productivity gain sharing should be accomplished by liaison with the project sponsor. Possible benefits include quickening the application of these interventions to a broader base in the public sector.

3. Quality Assessment Tools

Another important follow-on topic to this thesis is a study of tools for assessing organization-wide quality management. DOD organizations could benefit from

such tools, as the results of this thesis show a lag in this aspect of TQM implementation, including measuring customer satisfaction and results of quality efforts. Besides the need for objective quality performance indicators, additional measures of quality management can be obtained through organizational members' perceptions. In particular, developing a new survey questionnaire based on the Malcolm Baldridge National Quality Award criteria could provide an additional quantitative method of measuring individual perceptions of an organization's quality practices. This new survey would be more in line with concepts already familiar, accepted and used in both private and public sectors.

APPENDIX A SURVEY QUESTIONS

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Extent to which the top executive assumes responsibility for quality performance	1	2	3	4	5
Visibility of the quality department	1	2	3	4	5
Specific work-skills training (technical and vocational) given to non-supervisory employees throughout the organization	1	2	3	4	5
Thoroughness of new process/ service design reviews before the process/service is implemented/produced	1	2	3	4	5
Extent to which suppliers are selected based on quality rather than price or schedule	1	2	3	4	5
Use of acceptance sampling to accept/reject lots or batches of work	1	2	3	4	5
Availabilty of cost of quality data in the organization	1	2	3	4	5
Extent to which quality circle or employee involvement type programs are implemented in the organization	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Acceptance of responsibility for quality by major branch/ department heads within the organization	1	2	3	4	5
Quality department's access to top management	1	2	3	4	5
Quality-related training given to non-supervisory employees throughout the organization	1	2	3	4	5
Coordination among affected departments in the process/ service development process	1	2	3	4	5
Thoroughness of the supplier rating system	1	2	3	4	5
Amount of preventive equipment maintenance	1	2	3	4	5
Availability of quality data (error rates, defect rates, scrap, defects)	1	2	3	4	5
Effectiveness of the quality circle or employee involvement type programs in the organization	1	2	3	4	5
Degree to which top management (commanding officer/executive director/major department heads) is evaluated for quality performance	1	2	3	4	5
Autonomy of the quality department	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Quality-related training given to managers and supervisors throughout the organization	1	2	3	4	5
Quality of new processes/ services emphasized in relation to cost or schedule objectives	1	2	3	4	5
Reliance on reasonably few dependable suppliers	1	2	3	4	5
Extent to which inspection, review, or checking of work is automated	1	2	3	4	5
Timeliness of the quality data	1	2	3	4	5
Extent to which employees are held responsible for error-free output	1	2	3	4	5
Extent to which top management supports long-term quality improvement process	1	2	3	4	5
Amount of coordination between the quality department and other departments	1	2	3	4	5
Training in the "total quality concept"(i.e. philosophy of organization-wide responsibility for quality) throughout the organization	1	2	3	4	5
Clarity of process/service specifications and procedures	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Amount of education of suppliers by the organization	1	2	3	4	5
Amount of incoming inspection, review, or checking	1	2	3	4	5
Extent to which quality data (cost of quality, defects, errors, scrap, etc.) are used as tools to manage quality	1	2	3	4	5
Amount of feedback provided to employees on their quality performance	1	2	3	4	5
Degree of participation by major branch/department heads in the quality improvement process	1	2	3	4	5
Effectiveness of the quality department in improving quality	1	2	3	4	5
Training in the basic statistical techniques (such as histograms and control charts) in the organization as a whole	1	2	3	4	5
Extent to which implementation /producibility is considered in the process/service design process	1	2	3	4	5
Technical assistance provided to suppliers	1	2	3	4	5
Amount of in-process inspection, review, or checking	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low 1	Low 2	Medium 3	High 4	Very High 5
Extent to which quality data are available to non-supervisory employees	1	2	3	4	5
Degree of participation in quality decisions by non-supervisory employees	1	2	3	4	5
Extent to which top management has objectives for quality performance	1	2	3	4	5
Training in advanced statistical techniques (such as design of experiments and regression analysis) in the organization as a whole	1	2	3	4	5
Quality emphasis by customer service employees	1	2	3	4	5
Involvement of the supplier in the product development process	1	2	3	4	5
Amount of final inspection, review, or checking	1	2	3	4	5
Extent to which quality data are available to managers and supervisors	1	2	3	4	5
Extent to which quality awareness building among employees is ongoing	1	2	3	4	5
Specificity of quality goals within the organization	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Commitment of the top management to employee training	1	2	3	4	5
Extent to which longer term relationships are offered to suppliers	1	2	3	4	5
Stability of production schedule/work distribution	1	2	3	4	5
Extent to which quality data are used to evaluate supervisor and managerial performance	1	2	3	4	5
Extent to which employees are recognized for superior quality performance	1	2	3	4	5
Comprehensiveness of the goal-setting process for quality within the organization	1	2	3	4	5
Availability of resources for employee training in the organization	1	2	3	4	5
Clarity of specifications provided to suppliers	1	2	3	4	5
Degree of automation of the process	1	2	3	4	5
Extent to which quality data, control charts, etc., are displayed at employee's work stations	1	2	3	4	5
Effectiveness of supervisors in solving problems/issues	1	2	3	4	5

	Extent or Degree of Current Practice Is				
	Very Low	Low	Medium	High	Very High
Extent to which quality goals and policy are understood within the organization	1	2	3	4	5
Extent to which process design is "fool-proof" and minimizes chances of employee errors	1	2	3	4	5
Importance attached to quality by top management in relation to cost and schedule objectives	1	2	3	4	5
Clarity of work or process instructions given to employees	1	2	3	4	5
Amount of review of quality issues in top management meetings	1	2	3	4	5
Degree to which top management considers quality management as a way to increase revenues/reduce costs	1	2	3	4	5
Degree of comprehensiveness of the quality plan within the organization	1	2	3	4	5

APPENDIX B STATISTICAL ANALYSIS OF SURVEY RESULTS

The survey data was evaluated on its reliability using the internal consistency method. Cronbach's alpha, which is well suited to attitude instruments in which multiple questions are used to address a single dimension (i.e. training, process management), was chosen to assess internal consistency reliability (Jaeger, 1983). The SPSS/PC+ reliability program was used to conduct the analysis (Norusis, 1990). Missing data, which was minimal, was handled by substituting the median score for each survey question, so as not to exclude any survey responses from this study.

Results for the eight critical factors' reliability are detailed in Table 4, which shows that the reliability coefficients or alpha scores ranged from .73 to .91, all of which are considered adequate for reliability of research instruments. This analysis demonstrates that different questions intended to measure the same critical factor show convergence (Cronbach, 1951; Jaeger, 1983; Yin, 1984). These results further supported reliability evidence presented by the original developers of the instrument.

A correlation matrix for the critical factors of quality management was completed as an additional measure of discriminant validity, and is detailed in Table 7. Because the factors all deal with quality management, significant correlations are to be expected. All but four intercorrelations show at least 50% unique variance, thus supporting discriminant validity. The highest intercorrelation was found between leadership and employee

Table 7: SCALE TO SCALE CORRELATION MATRIX FOR THE CRITICAL FACTORS OF QUALITY MANAGEMENT

Critical Factor	Scale							
	1	2	3	4	5	6	7	8
Role of management leadership and quality policy (scale #1)	1.0	.58	.66	.71	.31	.46	.72	.79
Role of the quality department (scale #2)		1.0	.49	.58	.32	.37	.48	.58
Training (scale #3)			1.0	.56	.42	.43	.66	.66
Product/service design (scale #4)				1.0	.40	.58	.71	.69
Supplier quality management (scale #5)					1.0	.59	.42	.37
Process management (scale #6)						1.0	.64	.46
Quality data and reporting (scale #7)							1.0	.74
Employee relations (scale #8)								1.0

relations (r=.79). This suggests that these two dimensions have 62% variance in common, and 38% unique variance. While this is not a strong indication of discriminant validity, it was felt to be sufficient for purposes of this study.

APPENDIX C RESEARCH PARTICIPANTS

The executive steering group or committee at each of the following organizations participated in the thesis survey. A point of contact (POC) is shown for each organization as well as the name and title is listed for each organization's interviewee.

Sacremento Air Logistics Center   Major General Michael D. Pavich, USAF
McClellan Air Force Base   Center Commander
Sacremento, California
(POC Colonel Folz
    916-633-1164
    A/V 633-1164)

Navy Aviation Supply Office   Rear Admiral James E. Eckleberger, USN
(formerly Defense Industrial   Commanding Officer
Supply Center)
Philadelphia, Pennsylvania
(POC Mr. Marvin Sandler
    215-697-1375
    A/V 442-1375)

Naval Avionics Center   Captain Russell J. Henry, USN
Indianapolis, Indiana   Commanding Officer
(POC Mr. Thomas Sibert
    317-353-7470
    A/V 369-7470)

Naval Aviation Depot   Captain Thomas W. Hancock, USN
Naval Station Norfolk   Commanding Officer
Norfolk, Virginia
(POC Mr. Ross Haines
    804-445-1587)

Norfolk Naval Shipyard   Captain James T. Taylor, USN
Portsmouth, Virginia   Commanding Officer
(POC Mr. Duff Porter
    804-396-7092)

Naval Ship Systems
Engineering Station
Philadelphia, Pennsylvania
(POC Mr. James Summers
   215-897-7828)

Captain Dennis K. Kruse, USN
Commanding Officer

1926th Communications-Computer Group
Warner Robins Air Logistics Center
Warner Robins Air Force Base, Georgia
(POC Ms. Jeanie Spence
   912-926-7687
   A/V 468-7687)

Mr. Clifford E. Carroll
Executive Director

Naval Supply Center
San Diego, California
(POC Ms. Donna Tierney
   619-532-1689
   A/V 522-1689)

Captain Gary D. Lynn, USN
Executive Officer

Naval Aviation Depot
Marine Corps Air Station
Cherry Point, North Carolina
(POC Mr. John Adams
   919-466-7403
   A/V 582-7403)

Mr. John C. Adams
TQM Coordinator

Navy Aviation Supply Office, Code 10
(formerly Naval Publications
and Forms Center)
Philadelphia, Pennsylvania
(POC Mr. Dennis Cronin
   215-697-4919
   A/V 442-4919)

Lieutenant Commander
Kenneth K. Kittredge, USN
Director, Publications and Forms

APPENDIX D   TQM TRAINING COURSES

The following documents are available for purchase through DTIS and NTIS, with corresponding address and phone information listed at the bottom of the page.

TQM PROCESS ACTION TEAM COURSE (AD A225 197)
- Student Manual
- Plan of Instruction
- Case Study Exercise Handout
- Vu-graphs

TQM QUANTITATIVE METHODS WORKSHOP (AD A225 736)
- Student Manual
- Plan of Instruction
- Vu-graphs
- Answer Key for Selected Exercises

TQM AWARENESS SEMINAR (AD A225 212)
- Student Manual

TQM GROUP DYNAMICS WORKSHOP (AD A225 735)
- Student Manual
- Plan of Instruction
- Vu-graphs

TQM IMPLEMENTORS WORKSHOP (AD A225 141)
- Student Manual
- Plan of Instruction
- Vu-graphs

AN EDUCATION AND TRAINING STRATEGY FOR TQM IN THE DOD (AD A211 942)

AN INTRODUCTION TO THE CONTINUOUS IMPROVEMENT PROCESS: PRINCIPLES AND PRACTICES (AD A211 911)

A TQM PROCESS IMPROVEMENT MODEL (AD A202 154)

*MANAGING FOR ORGANIZATIONAL QUALITY-THEORY AND IMPLEMENTATION: AN ANNOTATED BIBLIOGRAPHY (AD A225 040)

*note: an exceptional reading list

Defense Technical Information Center   National Technical Information Center
ATTN: DTIC-FDRA   (NTIS)
Bldg. 5, Cameron Station   5385 Port Royal Road
Alexandria, Virginia   22305-6141   Springfield, Virginia   22161
(POC Marcie Stone: 703-274-3848)   (703-487-4650)

TRAINING SCHEDULE (adapted from Naval Supply Center, San Diego (QIP 3, 1991))

Course/Source/Hours	Dept Heads/ Deputies	Division Heads	Supervisors	Facilitators	Non-supervisory employees
Instituting Dr. Deming's Methods for Management of Productivity & Quality (George Washington University - 16 hours)	X	X			
Supervisory Competency Based Certification Program (NSC 26/Contracted Training - 120 hours)	•	X	•		
Introduction to TQM for Supervisors (NSC 26/04/Cadre - 32 hours)	X	X	X		
TQM for Non-supervisory Employees (Dept/Division Heads - 24 hours)				X	X
Basic Facilitator Training (NSC 26/04 - 40 hours)				X	
Advanced Facilitator Training (NSC 26/04 - 40 hours)				•	
Instructor Training (NSC 26 - 24 hours)	X	X	X	X	•
Building Winning Teams (NSC 26 - 4 hours)	•	X	•	•	•
Control Chart Training (NSC 04 - 8 hours)	X	X	X	X	•
Basic Management Statistics (Satellite Education Network - 40 hours)	•	X	•	•	•
Statistical Process Control (Satellite Education Network - 40 hours)	•	X	•	•	•

note: X = required training; • = optional training

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